

The American Journal of Obstetrics and Gynecology

VOL. XIII

ST. LOUIS, FEBRUARY, 1927

No. 2

Original Communications

THE BACTERIAL CONTENT OF THE UTERUS AT CESAREAN SECTION

BY JOHN W. HARRIS, M.D., AND J. HOWARD BROWN, PH.D.
BALTIMORE, MD.

*(From the Departments of Obstetrics and Pathology and Bacteriology, the Johns
Hopkins Hospital and University)*

IT IS becoming recognized that the mortality following cesarean section is much greater than is generally believed and, in some instances, is appalling. This has been emphasized by many writers, among whom may be mentioned: Williams,¹ Newell,² DeNormandie,³ and Holland,⁴ as well as in the 1923 Report of the Committee on Maternal and Infant Welfare of the Massachusetts State Medical Society.⁵ Certain of these reports show that the excessive maternal mortality is due, in great part at least, to the fact that it is not generally recognized that the danger of the operation increases progressively with every hour elapsing after the onset of labor, and is explained by finding that an ascending infection of the uterus occurs whenever labor has progressed for some time. Williams,⁶ in 1917, first adduced histologic evidence concerning the occurrence of such infections, which was still further confirmed when one of us (J.W.H.⁷) demonstrated its existence in twenty-two of thirty-three uteri removed by supravaginal hysterectomy following cesarean section when labor had lasted for six or more hours.

Walther,⁸ in 1919, reported that positive cultures were obtained from the amniotic fluid and uterine secretion at fifteen cesarean sections. He failed to state how long the patients had been in labor when the operation was done, but most of them had been in the hands of midwives or physicians before admission to the clinic and in all of them five to eighty hours had elapsed between the rupture of the membranes and the time of operation. His report fails to give the exact method employed in taking the culture, nor does he state the number

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

of sterile cultures obtained. When anaerobic cultures were made the deep agar shake technic was employed, and from his tables it appears that in only a single instance did the bacteria present in the anaerobic cultures fail to grow when incubated aerobically. Moreover, in seven of the fifteen patients the incisions healed imperfectly and from them he obtained bacteria which were identical with those originally obtained from the uterus. Such findings, he believed, indicated that infection of the incision had resulted from bacteria originating within the uterus and not from the exterior.

It seemed to us that a thorough bacteriologic study of the contents of the uterus obtained at cesarean section performed at varying stages of labor would be of value, more particularly if we could show how long labor can last without invasion of the uterus by bacteria, as well as the types of organisms which may be present when such invasion occurs. Furthermore, it seemed that such a study might give valuable information concerning the advantages and disadvantages of the several types of cesarean section in common use. We have, therefore, made such studies in fifty cesarean sections and in this paper we shall present the clinical aspects of our investigation, reserving for another the publication of the more technical bacteriologic details.

DESCRIPTION OF METHODS

All of the cultures were taken through the uterine incision, in order to insure that they could not be contaminated by the vaginal secretion. As soon as the child was delivered, and before the hands or instruments had been introduced into the lower uterine segment, a sterile, cotton-covered swab was passed through the uterine incision and rubbed over the lower uterine segment, care being taken that it did not come in contact with any portion of the uterus except that from which the culture was desired. As soon as possible smears were made from the swab, after which it was inoculated into the following media: anaerobic and aerobic human blood agar plates, anaerobic and aerobic dextrose acid agar plates, cooked meat sealed with vaseline, anaerobic and aerobic human serum bouillon, and aerobic lactose fermented bouillon containing bromeresol purple as an indicator. The anaerobic plates and bouillon were incubated in the anaerobe jar devised by one of us (J. H. B.⁹). It should be stated that in no instance were bacteria found in the primary smears which we were unable to grow in culture and identify.

CLASSIFICATION OF OPERATIONS

Since the type of cesarean section done in this clinic is largely determined according as the patient is operated upon before the onset of labor or a varying length of time afterwards, a convenient method of analyzing our results is to divide our cases into three groups according to the type of operation performed. When this is done it is seen that thirty-one were delivered by the classical, conservative operation, thirteen by the low cervical technic, and six by the radical procedure (supravaginal hysterectomy).

Classical Cesarean Sections.—Table I gives the data concerning the thirty-one patients who were delivered by classical, conservative cesarean section. For information concerning the exact details of this operation as performed in this clinic, the reader is referred to Dr. Williams' textbook.¹⁰ Table I shows that the thirty-one operations were performed at the following times in relation to the onset of labor:

(a) Before onset	19
(b) Doubtful onset	1
(c) Less than six hours after onset	6
(d) Six or more hours after onset	5
	<u>31</u>

In all these patients the temperature at the time of operation was normal. The cultures were sterile in twenty-five of the twenty-six

TABLE I
CLASSICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATIONS	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
VI	0	0	Intact	Closed	Febrile	Excellent	Sterile
VIII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XIX	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XX	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXVI	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XXXII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXXIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXXIX	0	0	Intact	Closed	Febrile	Excellent	Sterile
XL	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XLII	0	0	Intact	Closed	Afebrile	Excellent	Sterile
XLVII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LV	0	0	Intact	Closed	Febrile	Excellent	Sterile
LVI	0	0	Intact	Closed	Afebrile	Excellent	Sterile
LVII	0	0	Intact	Closed	Febrile	Excellent	Sterile
LVIII	0	0	Intact	Closed	Febrile	Excellent	Sterile
XXX	0	0	10 hr.	Closed	Febrile	Excellent	Staph. albus
LIX	Labor doubtful	0	Intact	Closed	Febrile	Excellent	Sterile
XII	2 hr.	0	Intact	2 cm.	Afebrile	Excellent	Sterile
XIII	2 hr.	1	Intact	1 cm.	Afebrile	Excellent	Sterile
XVII	3 hr.	3	Intact	3 cm.	Febrile	Excellent	Sterile
XXXI	3 hr.	0	10 hr.	Closed	Afebrile	Excellent	Sterile
XLV	4 hr.	0	Intact	3 cm.	Febrile	Excellent	Sterile
LX	4 hr.	0	Intact	Closed	Febrile	Excellent	Sterile
XIV	6 hr.	0	Intact	2 cm.	Febrile	Excellent	Aerobic diphtheroid
XLIX	6 hr.	0	Intact	4 cm.	Febrile	Poor	Anaerobic, hem. strep.
XXXVI	12 hr.	0	Intact	Closed	Febrile	Excellent	Aerobic diphtheroid
LIV	13 hr.	0	Intact	4 cm.	Febrile	Excellent	Anaerobic, nonhem. strep.
XXXIV	19 hr.	2	4 hr.	4 cm.	Febrile	Poor	Anaerobic, nonhem. strep.

uteri included in the first three groups, while in the remaining positive case the membranes had ruptured ten hours before operation and *Staphylococcus albus* only was isolated. In the twenty-six patients included in the first three groups, the wound healed per primam. In eleven of them the puerperium was afebrile, while in fifteen the postpartum temperature exceeded 100.4° F. Of the five patients in group (d), two had infected incisions and in all of them the puerperium was febrile. That the intact membranes are not an effective barrier to the entrance of bacteria into the lower uterine segment is shown by the fact that in four of these five patients the membranes were intact at the time of operation, and in two instances the invading organism was the streptococcus.

Low Cervical Cesarean Sections.—Thirteen of the fifty patients were delivered by low cervical cesarean section. The technical details of this operation as performed in this clinic are essentially those advocated by DeLee.¹¹ Table II shows that none of these patients were operated upon at an appointed time at the end of pregnancy, only three within twelve hours after the onset of labor, and ten from twelve to fifty-four hours afterwards. Sterile cultures were obtained from two patients, while bacteria were present in eleven. One sterile culture was obtained from a patient who was doubtfully in labor while, in the other, labor had lasted two hours when the operation was done. On the other hand, all of the eleven patients from whom positive cultures were obtained had been in labor from eleven to fifty-five hours before operation. In the two patients with sterile cultures the puerperium was normal in one and febrile in the other, whereas in the eleven infected patients only two presented afebrile puerperia. The incisions in both the patients with sterile cultures healed by primary union as in two of the eleven patients with infected uteri. However, in the remaining nine patients with positive cultures the incision was infected. Again attention should be called to the fact that positive cultures were obtained in two cases in which the membranes were intact at the time of operation, the streptococcus, together with other organisms, being isolated in both instances. That a normal temperature at the time of operation does not insure the absence of ascending infection is shown by the fact that in six of the eleven cases the temperature was normal when the operation was begun, while in only two was it more than 100° F.

Radical Cesarean Sections.—Six of the fifty patients included in this study were delivered by cesarean section followed by supravaginal hysterectomy. The data concerning them are to be found in Table III. The series is too small to permit definite conclusions but it is interesting to note that the only sterile culture was obtained in a patient who was doubtfully in labor and where the uterus was removed solely to effect

TABLE II
LOW CERVICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATION	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	TEMP. AT OPERATION	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
XVIII	Labor doubtful	0	Intact	Closed	Normal	Afebrile	Excellent	Sterile.
XXVII	2 hr.	1	2 hr.	3 cm.	Normal	Febrile	Excellent	Sterile.
LII	11 hr.	Many	11 hr.	10 cm.	100.0	Febrile	Poor	Aerobic, hem. strep. Staph. albus.
XXV	12 hr.	Many	12 hr.	3 cm.	Normal	Febrile	Poor	Aerobic diphtheroid. Anaerobic, non-hem. strep. Staph. albus. Aerobic diphtheroid.
VII	16 hr.	0	Intact	2 cm.	Normal	Febrile	Stitch abscesses	Anaerobic, nonhem. strep. Anaerobic diphtheroid.
XXXV	24 hr.	0	60 hr.	2 cm.	Normal	Febrile	Poor	B. pseudonecrophorus.
XXXVII	27 hr.	0	16 hr.	3 cm.	Normal	Afebrile	Excellent	Aerobic, hem. strep. Anaerobic nonhem. strep. Döderlein's bacillus. Yeasts.
LI	28 hr.	0	Intact	3 cm.	Normal	Febrile	Poor	Anaerobic, nonhem. strep. Staph. albus.
XI	28 hr.	Many	28 hr.	10 cm.	Normal	Febrile	Poor	Aerobic, nonhem. strep. Staph. albus. Aerobic, diphtheroid. B. welchii. B. pseudonecrophorus.
XXXVIII	40 hr.	0	3 hr.	10 cm.	100.6	Afebrile	Excellent	Aerobic diphtheroid.
XLIV	41 hr.	2	41 hr.	3 cm.	101.0	Febrile	Poor	Anaerobic, nonhem. strep. B. pseudonecrophorus. B. welchii.
XLVI	43 hr.	2	10 hr.	3 cm.	99.0	Febrile	Poor	Aerobic, hem. strep. Aerobic, nonhem. strep. Staph. albus. Staph. aureus. Aerobic diphtheroid.
XLVIII	55 hr.	1	55 hr.	4 cm.	99.4	Febrile	Poor	Anaerobic, hem. strep. Anaerobic, non-hem. strep. Staph. albus. Aerobic diphtheroid. B. welchii.

TABLE III
RADICAL CESAREAN SECTIONS

CASE NO.	DURATION OF LABOR	VAGINAL EXAMINATIONS	RUPTURE OF MEMBRANES	DILATATION OF CERVIX	TEMP. AT OPERATION	INDICATION FOR REMOVAL OF UTERUS	PUERPERIUM	HEALING OF INCISION	UTERINE CULTURE
IX	Labor doubtful	0	Intact	Closed	Normal	Sterilization	Febrile	Excellent	Sterile
XLI	10 hr.	0	Intact	4 cm.	Normal	Sterilization	Febrile	Excellent	Yeasts
L	10 hr.	Many	5 hr.	10 cm.	Normal	Tetanic uterus	Febrile	Excellent	Staph. albus. Aerobic diphtheroid
XLIII	17 hr.	0	17 hr.	2 cm.	101.0	Attempted version	Febrile	Excellent	Staph. albus. Aerobic diphtheroid
XXVIII	24 hr.	0	48 hr.	2 cm.	102.0	Infection	Febrile	Excellent	Anaerobic, nonhem. strep.
XXIX	24 hr.	4	24 hr.	1 cm.	100.4	Cyst blocking pelvis Cervical atresia Infection	Febrile	Excellent	Aerobic, nonhem. strep. Staph. aureus.

sterilization. While all six of these patients had febrile puerperia, all of the incisions healed by primary union and none of the patients were considered particularly ill. This is in accord with our experience with the radical operation, as we have observed that, even when done late in labor, it is generally followed by prompter recovery with fewer complications than the elective classical section.

DISCUSSION

It is generally admitted that the pregnant uterus is sterile up to the onset of labor. It has been shown by histologic and bacteriologic investigations, as well as by clinical experience, that the uterus which has been subjected to prolonged labor and, more particularly, to intrauterine manipulation, is frequently infected. The questions of special interest are, when does bacterial invasion occur and what factors control it. The factors which are generally considered to determine the presence or absence of bacteria in the uterus during labor are vaginal examinations, the time of rupture of the membranes, and the duration of labor. Moreover, it seems to be a widespread opinion that bacterial invasion of the uterus during labor promptly makes itself manifest by elevation of the temperature. We think that this series of cases may be studied profitably with these various factors in mind.

Without doubt vaginal examinations during labor, even when done with the strictest aseptic technic, definitely increase the likelihood of infection. It is probable that as soon as the routine rectal examination during labor, as a substitute for vaginal examination, comes into wider usage, this fact will receive increasing confirmation. However, the absence of vaginal examinations during labor by no means insures that the uterus is free of bacteria. This is shown by a study of our tables. In the series of fifty patients positive cultures were obtained from the lower uterine segment in twenty-two, and in thirteen of them no vaginal examinations had been made during labor. For this reason it seems permissible to conclude that the absence of vaginal examinations during labor does not necessarily insure freedom from bacterial invasion.

It is generally believed that premature rupture of the membranes adds materially to the danger of bacterial invasion of the uterus in that it favors ascending infection. That this is true our tables would seem to indicate. Of the twenty-two patients from whom positive cultures were obtained, the membranes had ruptured before the beginning of the operation in fifteen. On the other hand, in the remaining seven patients the membranes were intact and were ruptured only to permit delivery of the child through the uterine incision. From this it is seen that intact membranes do not offer a thoroughly effective barrier to the access of bacteria to the lower uterine segment.

Without doubt, prolonged intrapartum infection is generally accompanied by an elevation of temperature. However, in fourteen of the twenty-two patients with positive cultures the temperature at the time of operation was normal. The remaining eight patients did have elevations of temperature but two of these were less than 100° F. On the other hand, in all of the twenty-eight patients with sterile uterine cultures, the temperature at the time of operation was normal. These results lead us again to the conclusion that, while elevation of temperature during labor is generally an indication of bacterial invasion of the uterus, a normal temperature at that time cannot be accepted as a reliable sign that bacterial invasion has not already occurred.

When our tables are studied to determine the bearing upon the sterility of the uterus of the time at which the operation was performed it is possible to draw definite conclusions. In twenty-nine patients who had been in labor for less than six hours when cesarean section was done, twenty-eight cultures from the lower uterine segment were found sterile and one showed the presence of bacteria; the latter being from a patient in whom labor had not yet begun but whose membranes had been ruptured for ten hours. On the other hand, the lower uterine segment was found infected in all twenty-one patients in whom labor had lasted six hours or more. Expressed in another way, it might be stated that no sterile cultures were obtained from patients in whom active labor had lasted for six hours or more and only one positive culture was obtained where labor had progressed less than six hours. We think that this affords conclusive evidence that the uterus is free of bacteria at the end of pregnancy, but only during the first few hours of active labor, and that the probability of the occurrence of ascending infection increases with every additional hour. Our investigations justify the conclusion that ascending infection is probably the greatest single factor in the explanation of the disastrous results that so often follow cesarean section. We have attempted to ascertain by analysis of our cases whether the duration of labor affects the types of bacteria found in the lower uterine segment, but our series is too small to permit a definite answer. Moreover, whether the type of organism found in the parturient uterus is influenced by the duration of labor, or whether the character of the infecting bacteria is a matter of chance, cannot, we think, be definitely determined until the question of autoinfection is conclusively settled, and it has been determined whether the bacteria found in the uterus originate from bacteria already in the vagina or whether they have made their way upward from the outlet by extension along capillary layers of fluid.

All of the fifty patients included in our study recovered and were discharged from the hospital in good condition. Four babies were lost. Two of these were born alive but died within the first week after

delivery. In one instance, the section was done for intercurrent eclampsia, the mother having recovered from the acute attack but failing to respond to further eliminative treatment. The baby was premature and died of that cause. The other baby, which was delivered alive after a low cervical cesarean section following attempted forceps delivery, died a few days later and at autopsy a large intracranial hemorrhage was found. The two remaining fetal deaths had no connection with the operation, as the children were known to be dead when it was undertaken. In both instances the uterus presented a pronounced contraction ring after attempts at version. In one instance, a multipara with several living children, the unopened uterus was supravaginally amputated, while in the other, the dead child was delivered by low cervical cesarean section. In both of these patients we felt that further attempts at delivery through the vagina would most likely result in rupture of the uterus.

Based on the bacteriologic study of fifty uteri at cesarean section as well as upon our clinical experience, an expression of our views as to the merits of the three types of operation commonly employed might be of value. We think that when cesarean section is definitely indicated the ideal time for its performance is at an appointed time at the end of pregnancy or at the very beginning of labor, and that in such circumstances the classical, conservative section is the operation of choice. The technical simplicity of the operation together with the short time necessary for its performance, as well as the excellent results which follow the elective operation, are factors worthy of consideration. We appreciate the danger of possible rupture of the scar in subsequent pregnancies but, as this accident occurred only twice in more than two hundred conservative sections performed in our clinic, we believe that this danger should not be a deterring factor, provided the patients are chosen with care and the uterine incision is sutured properly. On the other hand, our bacteriologic studies, as well as our clinical experience, have convinced us that the classical cesarean section is a dangerous operation when labor has progressed for more than a few hours. The incised involuting uterus is always a source of danger, and undoubtedly offers but little resistance to the invasion of bacteria from the uterine to the peritoneal cavity, especially when the incision is made in the body of the organ.

In appropriate conditions we regard the low cervical cesarean section as a great advance in operative obstetrics. Through its use we have been able to preserve the uterus in a number of patients in whom, prior to its introduction, it would have been unhesitatingly sacrificed, together with the possibility of future child-bearing. Moreover, it has served to displace pubiotomy and craniotomy on the living child. On the other hand, the technical difficulties, particularly early in labor, before the lower uterine segment has become thinned out, as well as

in obese patients with thick abdominal walls, make us unwilling to substitute it for the classical section at an appointed time at the end of pregnancy or early in labor. We have come to regard it, nevertheless, as the operation of choice in patients in whom the time of election has passed but in whom there is no clinical evidence of infection and where it is desired to obtain a living child without the sacrifice of the uterus. Since in a large majority of our low cervical sections the convalescence has been prolonged and so many incisions have failed to heal by primary union, together with the fact that many of the patients impressed us as being seriously ill, we are not ready to extend its use to frankly infected patients. Indeed, even in the great majority of the cases in which we advocate its employment, our bacteriologic studies have shown that the uterus is already infected. As pointed out by DeLee,¹¹ however, probably due to the location of the uterine incision, the protective mechanism of the human body is better able to cope with infection in the pelvic connective tissue than in the free abdominal cavity.

While it is true that the introduction of the low cervical cesarean section has reduced the frequency of the radical operation in this service, we believe that the latter procedure still has an important function in operative obstetrics, especially in two types of cases. It is our experience that in the frankly infected patient the removal of the uterus at the time of section has resulted in no greater mortality than follows the classical operation done at the time of election. Consequently, whenever cesarean section becomes necessary in the presence of frank infection we feel that it should be followed by supravaginal amputation of the uterus. Furthermore, when for any reason it is desirable to effect sterilization at cesarean section, and the preservation of the menstrual function is a matter of indifference to the patient, we follow the same course. By so doing the wounded uterus is removed, the formation of adhesions is reduced to a minimum, and many of the dangers that follow the more conservative procedures are eliminated. We have been impressed repeatedly by the fact that the convalescence following radical section is smoother and more likely to be devoid of complications than after any other type of cesarean section. For these reasons, we still believe that it is a valuable procedure which will render satisfactory service in many desperate cases.

CONCLUSIONS

1. This paper is based upon the bacteriologic study of the uterine contents obtained at fifty cesarean sections.
2. In nineteen elective sections performed at an appointed time at the end of pregnancy and before the rupture of the membranes, the uterus was uniformly sterile.

3. The same applies to six cases in which the classical section was performed within four hours after the onset of labor.

4. In five patients in whom classical section was performed six or more hours after the onset of labor, bacteria could always be demonstrated in the lower uterine segment and there were streptococci in three of the cases.

5. Similar results were obtained in thirteen low cervical and six radical sections, and the uterine contents were sterile only in the three cases in which the operation was performed within a few hours after the onset of labor.

6. These bacteriologic findings clearly show why the conservative section is safe only when performed at the time of election.

7. While vaginal examinations and premature rupture of the membranes undoubtedly increase the likelihood of bacterial invasion of the uterus, the absence of these factors in no way insures a sterile uterus.

8. Elevation of the temperature, likewise, is a valuable sign of intrapartum infection, but a normal temperature cannot be accepted as evidence that ascending infection has not already occurred.

9. Whether the presence of bacteria in the uterine cavity is due to the upward extension of bacteria already in the vagina or to an ascending infection from the vulva cannot be determined until comprehensive studies of the bacterial flora of the vagina have shown whether the occurrence of autoinfection is possible or not.

REFERENCES

- (1) *Williams, J. W.*: Surg., Gynec. and Obst., 1917, xxv, 194-201. (2) *Newell, F. S.*: Cesarean Section, 1921, D. Appleton & Co. (3) *DeNormandie, R. L.*: Boston Med. and Surg. Jour., 1923 clxxxix, No. 25, 1011-1015. (4) *Holland, E.*: Jour. Obst. and Gynec. Brit. Emp., 1921, xxviii, 358-446. (5) Boston Med. and Surg. Jour., 1923, clxxxviii, 288-290. (6) *Williams, J. W.*: Bull. Johns Hopkins Hospital, 1917, xxviii, 335-343. (7) *Harris, J. W.*: Bull. Johns Hopkins Hospital, 1922, xxxiii, 318-321. (8) *Walthard, M.*: Arch. f. Gynäk., 1919, exi, 105-126. (9) *Brown, J. H.*: Jour. Exp. Med., 1921, xxxiii, 677-681. (10) *Williams, J. W.*: Obstetrics, 1924, Ed. 5, D. Appleton & Co., 499-504. (11) *DeLee, J. B.*: Jour. Am. Med. Assn., 1925, lxxxiv, 791-798.

CARCINOMA OF THE CERVIX UTERI AS TREATED IN THE
GYNECOLOGIC DEPARTMENT OF THE UNIVERSITY
HOSPITAL

(SERIES II, 1919-1923)

BY JOHN G. CLARK, M.D., AND L. KRAEER FERGUSON, M.D.
PHILADELPHIA, PA.

THE following study of carcinoma of the cervix is based on a group of 214 patients who came to the University Hospital during the years 1919 to 1923. Of this number, 30 cases have been discarded because their records are incomplete, or their course could not be traced. The remaining 184 cases serve as the basis for this report, of these 94 were treated, five or more years ago, of which 13 are living, or 13.8 per cent apparent cures. Three years have passed since treatment in 161 cases, with 27 or 16 per cent apparent cures.

There were 69 cases in which no pathologic diagnosis was available. The description of the lesion and the clinical diagnosis are reliable, however, as a positive diagnosis. Our experience has shown that there is an error of less than 1 per cent in the clinical diagnosis when checked by microscopic examination of the tissue. Most of our cases without pathologic confirmation were those in which large craters were found and were treated before biopsy was made a routine procedure.

In one of our cases we were unable to get a positive diagnosis of carcinoma after eleven slides had been examined microscopically, but the subsequent course of the case with metastasis to the bladder proved beyond a doubt that the case was one of carcinoma of the cervix.

The abstract cards furnished by the American College of Surgeons were used in briefing our cases, and we have used their groupings in our tabulations:

1. Primary case.
2. Previous panhysterectomy for carcinoma.
3. Previous supracervical hysterectomy.
4. Diseases confined to cervix.
5. Diseases involving uterus or vaginal walls.
6. Broad ligaments involved.
7. Wide metastasis.

Our study was made with the following outline in view:

First, to obtain a summary of the first or initial symptoms noticed by the patients.

Second, to obtain a summary of the symptoms of which the patients complained when they applied for treatment. These we have called the presenting symptoms. An effort was made to form a relationship

between these symptoms and the extent or form of the disease discovered clinically.

Third, since nearly all of these patients received a relatively constant form of treatment (radium, with or without a palliative operation), to determine the effect of the various variables on the results of the treatment. The variables are:

1. Duration of disease before treatment; i.e., interval from first symptom to first treatment.
2. Age of patients.
3. Pathologic type of disease.
4. Extent of disease.
5. Type of treatment.

A study of the mode of death was made to determine if possible the usual direction of extension of the process in order to form a more logical method of subsequent treatment. The results of treatment are given in each case, in terms of duration of life, and, finally, a summary of the results was made, showing the effect of irradiation on the symptoms—pain, hemorrhage, and discharge.

INITIAL SYMPTOMS AND PRESENTING SYMPTOMS

The first or initial symptoms noted by the patients coming for the treatment for carcinoma of the cervix are given below:

1. Intermenstrual spotting	32.6 per cent
2. Irregular vaginal bleeding	29.8 per cent
3. Profuse menstrual flow	2.2 per cent
4. Bleeding after coitus	1.6 per cent
5. Spotting when changing pessary	1.0 per cent
6. Spotting and thin discharge	7.2 per cent
7. Foul, profuse, watery leucorrhea	16.6 per cent
8. Pelvic pain and discharge	1.0 per cent
9. Sudden increase of amount of leucorrhea	1.0 per cent
10. Rectal pain	1.0 per cent
11. Sacral backache	1.0 per cent
12. Frequency of urination	0.5 per cent
13. Mass in the vagina	0.5 per cent
14. Vaginal soreness	0.5 per cent
15. Lower abdominal and pelvic pain	2.2 per cent

Of this group of symptoms 74.4 per cent have to do with hemorrhage in some form, 25.8 per cent deal with discharge, and 5.7 per cent concern pain.

The symptoms present when the patient came for treatment fall into three main groups: bleeding, discharge, pain, or combinations of these three.

A fourth group, urinary symptoms, viz.: frequency, urgency, vesical irritability, dysuria, and incontinence is often associated with these.

Practically all patients complained of constipation to a greater or lesser degree. The groups follow:

1. Bleeding, discharge and pain.....	54.7 per cent
Of this group 30 per cent had urinary symptoms in addition.	
2. Bleeding and discharge.....	30.9 per cent
Of this group 16 per cent had urinary symptoms in addition.	
3. Bleeding and pain.....	7.2 per cent
Of this group 23 per cent had urinary symptoms in addition.	
4. Bleeding (alone).....	1.6 per cent
5. Discharge (alone).....	1.6 per cent
6. Pain (alone).....	1.0 per cent
7. Discharge and pain.....	1.0 per cent
8. Mass in vagina.....	0.5 per cent

Of this group of symptoms 94.4 per cent have to do with hemorrhage in some form, 88.2 per cent deal with discharge and 63.9 per cent concern pain.

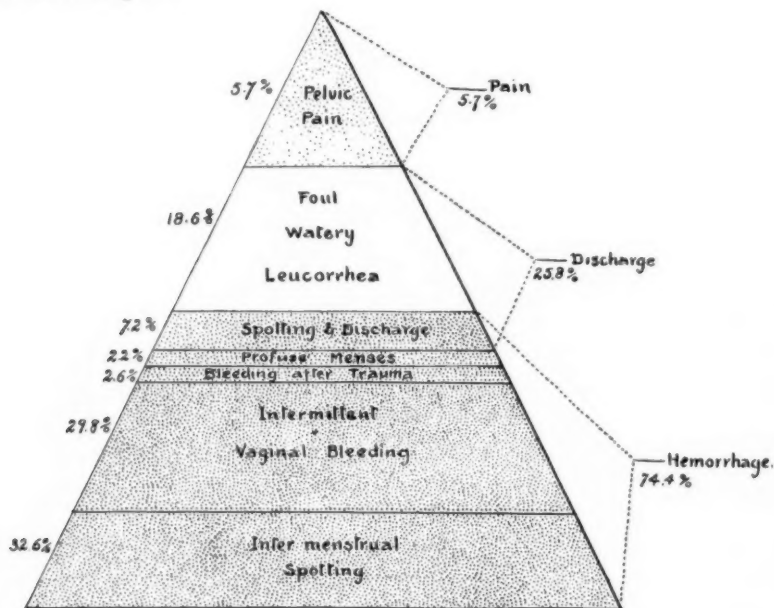


Fig. 1.—Pyramid of initial symptoms of carcinoma of the cervix built on hemorrhage, tipped with pain.

A comparison of these figures with those of the preceding table shows an increase in all the figures. Hemorrhage noted as the first symptom in three-fourths of the cases, is a prominent symptom in nearly every case coming for treatment. Discharge was noted as an initial symptom in one-fourth of the cases, but is present in seven-eighths of the cases on admission. Pain, unfortunately rather infrequent (5.7 per cent) as an early symptom, occurs as a presenting symptom in nearly two-thirds of the cases.

Patients too often put off their treatment until pain becomes prominent or until bleeding and discharge become excessive.

In our analysis of these cases, we find that the severity of the symptoms bears no constant relation to the extent of the disease.

TABLE I
DURATION OF SYMPTOMS

GROUP	LESS THAN									TOTAL
	3 MOS.	3 MOS.	6 MOS.	9 MOS.	1 YR.	1½ YRS.	2 YRS.	3 YRS.	4 YRS.	
A.	5	10	3	1	4	1	1			25
B.	3	5	4		3	1		1		17
C.	13	19	14	11	26	4	8	1	1	97
D.	1	2	9	3	3	2	3			23
5 yr. cures	1	7	1		1	1		1		12

Of those patients who came for treatment within six months from the time of their first symptom: 20 per cent were in Class A, 13.8 per cent were in Class B, 55 per cent were in Class C and 5 per cent were in Class D. (Table I.)

Sixty per cent of those patients treated within six months from the time of their first symptom were in the advanced stage of carcinoma; 14 cases in this advanced group had their symptoms less than three months before treatment. In view of these facts, we may say that the duration of the symptoms bears little or no relation to the extent of the carcinoma. *

Of those cases who came for treatment six months or more after the first symptom had been noted: 9.5 per cent were in Class A, 9 per cent were in Class B, 62.5 per cent were in Class C and 19 per cent were in Class D.

Eighty-one per cent of the patients who appear in the hospital six months or more after the first symptoms are in the inoperable stage.

Early treatment offers more hope for a cure of the disease. Thirteen and eight-tenths per cent of the cases treated within six months from the first symptom are "five year" cures, while, of those treated after their symptoms had been present six months, only 3.8 per cent are "five year" cures.

PATHOLOGIC TYPE OF DISEASE

In this series, the epithelioma group was not divided into basal and squamous-celled types. Two groups then are presented, the adenocarcinomata and the epitheliomata. There were 114 cases with pathologic diagnosis, and of these 15, or 13.5 per cent, were adenocarcinomata, and 99, or 86.5 per cent, were epitheliomata.

Of the adenocarcinoma group, there were 2 five year cures, 13 per cent, and 3 three year cures, 20 per cent. Of the epithelioma group, there were 10 five year cures, 10.4 per cent, and 17 three years cures, 17.7 per cent. Little difference, therefore, is noted in the success of treatment in either type of cancer. We are unable to confirm the lack of success experienced by other writers (Cullen) in their treatment of the adenocarcinoma group.

The cases which develop in younger women, below fifty, seem less responsive to treatment. Of the 27 three year cures, eleven cases, or 40.6 per cent are under fifty and sixteen cases or 59.4 per cent are over fifty. Of the thirteen five year cures, four cases or 30 per cent are under fifty and nine cases or 70 per cent are over fifty. Of the 85 cases who were under fifty years of age 4.7 per cent are five year cures. Of the 98 cases who were over fifty, 9.8 per cent are five year cures.

Since the data to follow deals with the results of treatment, the figures used may require a word of explanation. Our data are compiled from the records of cases treated during the years 1919 to 1923, and our work was completed in 1925. Only a certain portion of our cases then, are eligible in compiling five year statistics, and these we

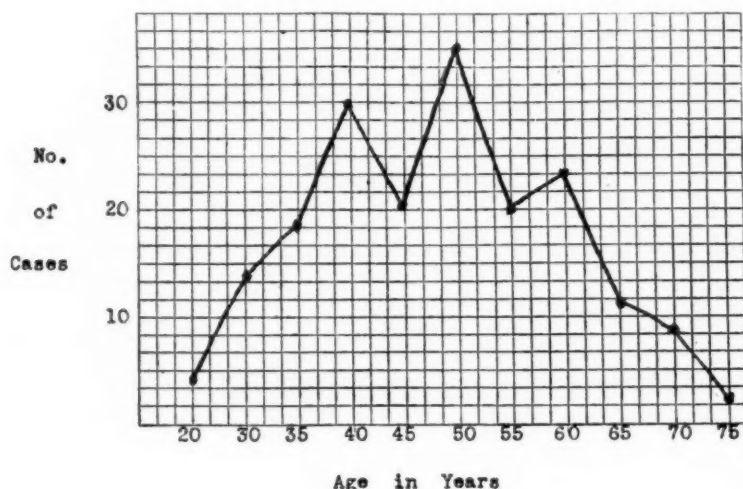


Fig. 2.

have designated as having "passed the five year interval." In the same way, our three year statistics are compiled from those cases who were treated three or more years before our analysis was made, and are designated as having "passed the three year interval."

TABLE II
LENGTH OF LIFE

GROUP A CASES TREATED BY	LESS THAN 1 YR.	YEARS							OPERATIVE FATALI- TIES	DIED OF OTHER CAUSES	TOTAL
		1	2	3	4	5	6	7			
Radium alone		5	2	2				2		1	12
Cautery, amputation plus radium			1	2		3	2		2		10
Hysterectomy plus radium	1	1									2
GROUP B											
Radium alone	6	3	2	1				1	1	1	15
Cautery plus radium	1				1			1			3
Hysterectomy plus radium						1					1

The operative mortality of Group A was 20 per cent, and that of Group B, 7 per cent. (Table II.) These groups comprise the operable and borderline cases.

Of Group A, thirteen have passed the five year interval. Seven were treated with radium (alone) with two five year cures,—28.5 per cent. Six were treated with cautery and radium with five five year cures,—83 per cent. Total five year cures, seven, 53.8 per cent.

Twenty-one cases have passed the three year interval. Eleven were treated with radium (alone) with four three year cures,—36 per cent.

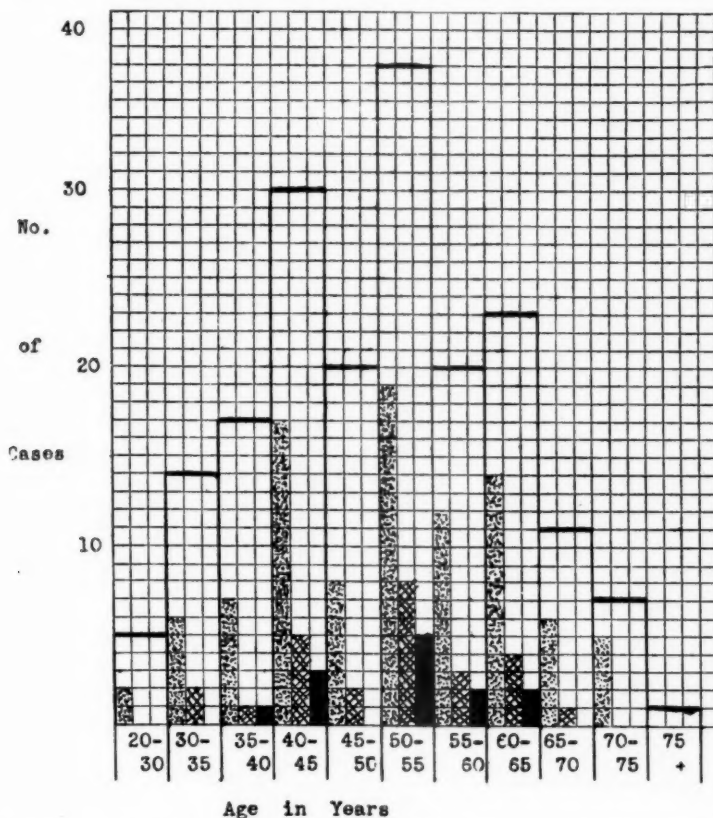


Fig. 3.—Each block represents a period of five years. In the first column, dotted, are represented patients who lived one year after treatment. In the second column, shaded, are represented patients who lived three years after treatment. In the third column, black, are represented patients who lived five years after treatment.

Ten were treated with cautery and radium with seven three year cures,—70 per cent. Total three year cures, eleven, 52 per cent.

Of Group B, twelve cases have passed the five year interval. Nine cases were treated by radium (alone) with no five year cures. Two cases were treated with cautery and radium with no five year cures. One case was treated with radium and hysterectomy with one five year cure. Total five year cures, one, 8.3 per cent.

Fifteen cases have passed the three year interval. Of these, twelve cases were treated by radium (alone) with one three year cure. Three cases were treated by cautery and radium with one three year cure. One case was treated by radium and hysterectomy with one three year cure.

Of Groups A and B, but three cases were operated upon with one cure. Twenty-seven were treated with radium, and thirteen with high frequency cautery amputation plus radium. Although the group is too small to make positive deduction, the high cervical amputation with the cautery, immediately followed by radium, seems to give the best results in these early cases. It seems probable that a removal of all the growth may frequently be accomplished by this method, and when some of the carcinomatous tissue remains, it is more easily and more directly exposed to the radium rays. The prognosis is much less favorable when the disease has progressed beyond the cervix.

TABLE III
INOPERABLE GROUP

GROUP C CASES TREATED BY	LESS THAN 1 YR.	YEARS							FATAL	DIED OF OTHER CAUSES	TOTAL
		1	2	3	4	5	6	7			
Radium alone	33	21	11	3	2	1	1	3	0	3	78
Cautery and radium	4	4	4			1			1		14
Hysterectomy and radium											
GROUP D											
Radium alone	10	7	2	1							20
Cautery and radium											
Hysterectomy											

Of Group C (Table III), forty-four have passed the five year interval. Of these, thirty-nine were treated by radium (alone) with two five year cures, 5 per cent. Five were treated by cautery and radium with one five year cure. Total five year cures, three, 7 per cent.

Seventy-two cases have passed the three year interval. Of these, sixty-one cases were treated by radium (alone) with seven three year cures, 11 per cent. Eleven were treated by cautery and radium with one three year cure. Total three year cures, eight, 11 per cent.

Of Group D (Table III), nine cases have passed the five year interval with no cures. Fourteen have passed the three year interval with one cure.

When the disease has extended beyond the uterus into the broad ligaments and paracervical tissues, the possibility of a cure is most remote. The relief of symptoms is the best that can be hoped for in these cases. Occasionally, usually in a patient well past fifty years, a five year cure may be obtained, but such results come as a surprise rather than an expectation. Radium, alone, has proved the best means of therapy in these cases, in our hands, except where the growth is of

TABLE IV
LENGTH OF LIFE

GROUP 4 (A, B, C, D)	MONTHS					YEARS									OP.
	NO.	3-6	6-9	9-12	1-2	2-3	3-4	4-5	5-6	A	B	C	D	DEATH	
Cases dead (after treatment)	14	2		5	3	2	1						14	1	
Cases living	2								2	2					

the cauliflower type, where the irradiation may be preceded by a cautery excision of the growth.

Group 4 (Table IV) (A, B, C, D) where carcinoma developed in the cervical stump following supracervical hysterectomy.

Of these cases, ten were first treated five or more years ago with two apparent cures. Both of these cases had cervical involvement only. In the three year group are fifteen cases, with three cures. All the cases were treated with radium, alone, except one case in which a cautery amputation of the growth was followed by radium. This case lived three years, but died of cancer.

The possibility of fistula formation after irradiation is decidedly

TABLE V
CASES OF RECURRENCE FOLLOWING PANHYSTERECTOMY FOR CANCER

	MONTHS				YEARS				NO. CASES
	?	3-6	6-9	9-12	1-2	2-3	3-4	4-5	
Length of life from time of radium application		1	1	1	2	1	3	1	11

increased in those cases where carcinoma has developed in the cervical stump following a supracervical hysterectomy. Three developed in our sixteen cases, an incidence of 18.7 per cent. Two of them were ureterovaginal, and one was vesicovaginal.

Of this series of eleven cases (Table V), three of the panhysterectomies were performed in the University Hospital. In one case, radium was applied three days before hysterectomy, seven days before in another, and four months afterwards in the third.

Eight cases were referred to our clinic for treatment following a panhysterectomy which had been performed elsewhere. Five cases

TABLE VI
TYPE OF TREATMENT

<i>Radium alone</i>		
DURATION OF LIFE AFTER TREATMENT	TOTAL CASES	PERCENTAGE OF CASES
Less than 1 year	55	41 %
1 year plus	69	51.5%
2 years plus	31	23 %
3 years plus	13	
5 years plus	4	

lived two years after radiation, and 2 lived three years. There was one five year cure. One case developed both a rectovaginal and vesicovaginal fistula after radiation.

Radium was used in 134 primary cases. There were two operative mortalities. One death was due to septicemia four days after a simple application of radium to the cervix. The other case developed obstinate vomiting and died in the hospital one month after irradiation. Operative mortality, 1.4 per cent. The first irradiation was done five or more years previously in 68 patients, and of that number four are living, 5.9 per cent. Of these cures, 2—A, and 2—C.

These 68 cases: 9—A—13 per cent, 9—B—13 per cent, 37—C—54.4 per cent, 9—D—13 per cent, 4—Class not given.

One hundred and seven presented themselves for treatment three or more years ago; of these, fourteen cases are living, 12 per cent.

OF THESE 3 YEAR CURES:	AND THE 107—WHOLE GROUP:
4—A	12—A
2—B	12—B
7—C	65—C
1—D	14—D
	5—Class not given.

One case of vesicovaginal fistula developed. Five cases died of causes other than cancer, four of whom were relieved of their symptoms at the time of their death.

	CAUSE OF DEATH	CLASS	TIME SINCE TREATMENT	RELIEVED
(1)	Cardiac	B	8 months	Plus
(2)	"	C	1 month	"
(3)	Cardiorenal dis.	C	2 months	Plus
(4)	Embolism	C	4 months	"
(5)	Apoplexy	A	4 months	"

Radium dosage averaged less than 2400 mg. hours per patient. The largest amount in the five year cures was 2400 mg. hours and the smallest amount, 1200 mg. hours.

TABLE VII
CAUTERY AMPUTATION AND RADIUM

DURATION OF LIFE AFTER TREATMENT	TOTAL CASES		
	CASES DEAD	CASES LIVING	
Less than 1 year-----	6		
1 to 2 years-----	5	1	
2 to 3 years-----	1	2	
3 to 4 years-----	1	2	
4 to 5 years-----	1		
5 to 6 years-----		6	
Op. Fatality -----	3		
Totals -----	17	11	
TOTALS			
1 year plus-----	8	11	19
2 years plus-----	3	10	13
3 years plus-----	2	8	10
5 years plus-----		6	6

Cautery amputation and radium were used in twenty-eight cases. (Table VII.) By these terms, we mean that the growth, and usually the cervix, was amputated, in most cases by cautery, or the cervix and growth were amputated with knife or scissors followed by cauterization of the stump. The best results followed the immediate application of radium after the cautery had been applied. Three operative fatalities occurred in the twenty-eight cases, 10.6 per cent. Two of these patients died from septicemia. In one of these cases a pyometra was present at the time of treatment. The third case died from peritonitis following the development of a rectovaginal fistula. Two fistulae occurred, one uterovaginal, and one rectovaginal. Of the twenty-eight cases, fourteen have passed the five year interval with six cures, 42.9 per cent. The six cures were: 5—A, and 1—C. Of these fourteen cases, seven, 50 per cent, were in Group A.

Twenty-four cases have passed the three year interval since the first treatment, and of this group ten are living, 41.6 per cent cures. Of the ten apparent cures, seven or 70 per cent were in Group A.

Cautery amputation of the cervix and radium gave the best results of any form of treatment. This procedure is most applicable to the early cases. The operative mortality is considerably higher than when radium alone is used.

RESULTS OF TREATMENTS

	RELIEVED	LESSENE	INCREASED	UNCHANGED
Pain	19.6 per cent	7 per cent	65 per cent	21 per cent
Hemorrhage	54 per cent	24.5 per cent	8.6 per cent	12.5 per cent
Discharge	34 per cent	36 per cent	14 per cent	16 per cent

Duration of Relief.—Less than three months, 5.4 per cent; three months, 4.6 per cent; six months, 18 per cent; nine months, 11.4 per cent; one year, 19.4 per cent; two years, 12 per cent; three years, 4 per cent; five years, 4 per cent; six years, 4 per cent; and not benefited by radium, 16 per cent.

The percentage figures in the above lists are calculated on the number of cases in which the appropriate information was available. It is seen that in three-fourths of the cases radium was beneficial in relieving the bleeding and discharge for a time. The average duration of relief was about one year. Local healing was reported in forty-two cases, 22.8 per cent. Of these, eighteen cases showed extension of the process later, five to the anterior vaginal wall, two to the bladder, ten deep in the pelvis, usually in the uterosacral areas, and one to the liver.

Pain may be temporarily relieved by radium in some cases, but in another large group of cases, radiation seems to be followed by an increase of pain. It is a question whether this increase is not due to the natural course of the disease, rather than to the method of treatment.

MODE OF DEATH

The mode of death was recorded in 92 cases. These have been tabulated as follows:

	Cases
Wide pelvic metasis, usually with extreme pelvic pain and in many cases pain in thighs and legs from involvement of adjacent nerve trunks	32
Marked cachexia	17
Fatal vaginal hemorrhage	4
Recurrence involving rectum and bladder	4
Rectal metastasis	9
3 developed intestinal obstruction	
1 died of an acute hemorrhage	
Uremia, from ureteral involvement	5
Bladder metastasis	5
2 ureterovaginal fistulae developed	
3 vesicovaginal fistulae occurred	
Recurrence in anterior vaginal wall	4
General abdominal metastasis	2
Bone metastasis	2
Metastasis to left axilla	1
Hepatic metastasis	1

There were six operative deaths due to the following causes:

	Cases
Septicemia	3
2 following cautery and radium	
1 following radium alone	
Femoral and pelvic phlebitis, followed by uremia, after cautery and radium	1
Peritonitis with rectovaginal fistula after cautery and radium	1
Persistent vomiting following radium alone	1

Five other cases died of causes not due to cancer:

	Cases
Cardiac failure	2
Cardiorenal disease	1
Cerebral embolism	2

Four of these cases are noted as being symptom-free at the time of their death. The other is not recorded.

The commonest direction of extensions of the carcinomatous process seems to be posteriorly, either along the uterosacral ligament to involve the antesacral structures or down and back to involve the ureters and rectum. Pain is the chief symptom as the antesacral tissues and nerves are invaded, while appropriate obstructive symptoms develop if the rectum and ureters are involved.

Extension of the carcinoma anteriorly is not rare, but much less common than the posterior growth.

Nearly all patients who die show a marked degree of cachexia, probably due to a prolonged absorption of toxic product from the infected carcinomatous ulcer. This element combined with a marked

anemia, secondary to the frequent vaginal hemorrhage, contributes largely to the death in many cases.

Acute hemorrhage may terminate any extensive case of carcinoma of the cervix. It was the immediate cause of death in 5 per cent of our recorded cases.

Metastasis from carcinoma of the cervix may be found almost anywhere in the body. One recent case, not in this series, died with cerebral metastasis.

SUMMARY OF THE CASES OF CANCER OF THE CERVIX

1. Thirteen out of ninety-four cases lived five years or more after treatment, 13.8 per cent five year cures.

Twenty-seven out of 161 cases lived three or more years after treatment, 16 per cent three year cures.

2. The first symptom in three-fourths of the cases concerns hemorrhage in some form.

3. Patients usually wait until bleeding and discharge become excessive, or until excessive pain forces them to seek medical attention.

4. Of all those cases who came for treatment within six months from the time of their first symptom, 60 per cent were inoperable.

A case treated during the first six months of disease has one chance in seven of a five year cure.

A case treated after the first six months of disease has one chance in twenty-six for a five year cure.

5. Of the series, there were 13.5 per cent adenocarcinomata, and 86.5 per cent epitheliomata. Approximately the same results were obtained in the treatment of each type.

6. The older the patient, the better the prognosis for prolongation of life, or actual cure of the disease.

7. In Group A: Radium alone cured two in seven cases, 28.5 per cent five year cures. Cautey and radium cured five in six cases, 83 per cent five year cures.

8. In Group B: Radium or cautey plus radium gave no five year cures in eleven cases. There was one case of hysterectomy plus radium living five years.

9. In Group C: Radium alone cured two in thirty-nine cases, 5.1 per cent five year cures. Cautey and radium cured one in five cases, 20 per cent five year cures.

10. In Group D: There were no five year cures in nine cases.

11. In all classes of cases: Radium alone cured four in sixty-eight cases, 5.9 per cent five year cures with an operative mortality of 1.4 per cent. Cautey, amputation and radium cured six in fourteen

cases, 42.9 per cent five year cures, with an operative mortality of 10.6 per cent.

12. Radium was effective in temporarily relieving hemorrhage and discharge in 75 per cent of the cases treated. Pain may be relieved for a time, but in a considerable number of cases, pain seems to be increased by radiation. The average duration of relief of symptoms was about one year.

2017 WALNUT STREET

SOME RESULTS OBTAINED WITH PARATHYROID EXTRACT IN THE CONTROL OF IDIOPATHIC MENSTRUAL BLEEDING

BY EDWARD ALLEN, M.D., AND EDWARD L. COMPERE, JR., M.S.
AND WILLIAM C. AUSTIN, PH.D., CHICAGO, ILLINOIS

*(From the Department of Obstetrics and Gynecology, Rush Medical College
and the Department of Biochemistry, Loyola University Medical School)*

IN THE first complete report of success in raising the blood calcium of dogs and in controlling tetania parathyreopriva by the injection of an extract prepared from the parathyroid gland, Collip¹ mentioned the fact that the viscosity of the blood of these dogs was increased as the calcium content became greater. He noted further, that the blood in the heart and in the great vessels was usually clotted within a few minutes after death, and especially was this true if death were due to the marked rise in blood calcium which he has called hypercalcemia.

In repeating some of the work of Collip, and in making a study of the condition of hypercalcemia previously described by him, this increased viscosity of the blood was noted and our attention was called to the fact that the clotting time was so short that it was difficult to obtain blood directly from the heart of the living animal through a large-bore needle. Further observation revealed the fact that when vessels as large as the internal mammary were severed, bleeding was minimal and stopped very quickly.

The clinical possibilities of such information presented themselves to us. If therapeutic amounts of the parathormone were given to patients we might reasonably expect a similar shortening of the clotting and bleeding time and consequent reduction of blood loss, in cases of prolonged menstrual bleeding.

The problem of regulating the length of the menstrual period and the actual blood loss of that class of unfortunates known as idiopathic menstrual bleeders has long interested the gynecologist. The vitality and strength of these patients are so often exhausted by the long and profuse bleeding that they do not recover completely from one menstrual period before the next begins.

Previous investigators have found that operative measures or the

administration of ergot, pituitrin, and other oxytocics, afford, at best, only temporary relief. Radium and x-ray therapy have been used in various clinics, and these rather radical measures have produced varying degrees of benefit from a slight reduction in the blood loss to a permanent and complete amenorrhea and sterility. Because of their effect on the maturing ova they must be used with extreme caution, and we doubt their practical application to the problem of controlling this idiopathic menstrual bleeding. Surgical procedures, including the removal of the uterus, have been found necessary in the past in some instances, where all other measures failed to correct the condition.

Although our results cannot be taken as conclusive, they are at least suggestive of the possibilities of the hormone if used in the optimum dosage and at the proper time. We have used comparatively small doses of the extract (Parathormone, Lilly) in the beginning, and by gradually increasing the amounts, have endeavored to establish a minimal dose that can be used with satisfactory clinical results. We do not feel that we have yet reached the most satisfactory dose limit.

Fortunately the percentage of patients suffering from a condition such as the one with which we are dealing, is very small. We were able to locate for our work three patients who could be definitely classed as idiopathic menstrual bleeders, and a fourth bleeder whose only pelvic pathology was an enlarged cystic ovary on the right side.

We know, of course, that this is a very small series and that our methods of determining blood loss are open to question. We offer our results only as a preliminary report, hoping thus to stimulate investigation along this line.

It is not possible by any laboratory methods known to us to determine, without some degree of error, bleeding or clotting times. In order to reduce the percentage of error to the smallest possible degree, one man has made all of the determinations. The capillary pipette method was used. Blood was drawn into the tube from a fresh ear puncture and sections of the tube were broken off every fifteen seconds. The end point was recognized when a string of fibrin appeared.

In our attempt to determine the relative amounts of blood lost at each period the patients have kept their pad counts and we have been compelled to rely upon their judgment as to the amount of blood lost with stool and urine.

The calcium determinations were made by one of us (W. C. A.). The Tisdall serum method on 2 c.c. portions of blood plasma secured by centrifuging blood collected upon heparin, which delays coagulation, was used.

We found that we obtained our best results when we divided the

amount of hormone to cover a three- or four-day period. It is possible that much more striking results may follow the use of larger doses, for we have been unable to obtain more than the normal menstrual rise in the blood calcium thus far. In our subsequent work we shall gradually increase the amount given at each period until we have determined what we consider the safe optimal dose.

At present we are inclined to recommend a total dosage of from 120 to 160 units, given in divided doses of 20 units, morning and evening. The best results were obtained by starting the intramuscular injection the day before the period was due.

The case records of the individuals we have treated are given below:

CASE 1.—The patient had a chronic pharyngitis for two years with temperature of 99°-99.4°. At the time of her menstrual period it usually went up to 99.8°.

Menstruation which began at thirteen years of age, has been irregular, varying from 18 to 29 days. The periods last from 5 to 7 days and during the months just prior to beginning the parathormone therapy they have all been from 6 to 8 days and very profuse.

TABLE I, CASE 1

DATE	NOTATION	THERAPY (UNITS EXT.)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
April 3	Period began	None	Not taken	Not taken			
April 9	Stopped	None	Not taken	Not taken	7	20	Not taken

Remarks: The patient suffered from cramps and headache on the second and third days and from nausea on the fourth and fifth days.

April 27	Began to	0	3' 30"	2'			
April 28	menstruate	0					
April 29		80					10.52
April 30		0	1' 10"	55"			10.77
May 2		0			5	17	

Remarks: The doses were very large and were given within a few hours of each other. The patient suffered from nausea, chills, vomiting, and a severe headache, with temperature of 103.6° within three hours after the first injection of the parathormone. On the morning after the injection of this rather massive dose the bleeding stopped completely for about six hours, when it began again but stopped completely on May 2. The patient complained of some dizziness on the next day and of headache on the second and the third day after this injection. Forty of the 80 units were given intravenously.

May 19	Entered hospital	6					9.28
May 20		8	3' 30"	3' 15"			
May 21		8					
May 22	Began to menstruate	8					
May 23		25					
May 24		18	2' 15"	3'			10.07
May 25		0					
May 26	Went home	0					
May 28	Stopped	0			6	23	

Remarks: All of the injections here listed were given subcutaneously. This period was complicated by a slight operation on the patient's eye on May 23, and by a copious hot enema on May 24. The amount of hormone was only 73 units,

30 of which were given during the three and a half days that the patient was in the hospital before the period began. The total amount of hormone was not sufficient and was distributed over too long a period to obtain any noticeable effect.

TABLE I, CASE 1—Cont'd

DATE	NOTATION	THERAPY (UNITS EXT.)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
June 15	Began to menstruate	6	3'	3'			11.06
June 16		6					
June 17		8 subcut. 15 intrav.					
June 18		12 subcut. 15 intrav.					
June 19	Stopped	15 subcut. 15 intrav.	1' 10"	1'	5½	14	11.26
June 22		0					

Remarks: This period was the best that this patient has had, and she is enthusiastic about continuing the treatment. She received a total of 91 units of the parathormone, which is a very small amount when distributed over several days. Her loss of blood was much less than that of the usual period, and her discomfort consisted merely of headache and slight nausea, with some mild cramps.

CASE 2.—The patient was a large woman, aged twenty-six. She began menstruating at the age of sixteen. Her periods were regular, 28 days, and lasted six days. She was well until June, 1925, when the periods became much prolonged, lasting from two to three weeks. She was curetted on February 28, 1926, but without relief. When she entered the hospital for parathormone injections on May 14, 1926, she had been bleeding continuously since April 8, 1926, using four pads each day, also passing large clots with stool and urine.

TABLE II, CASE 2

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
Apr. 8	Began to menstruate and continued to bleed until on						
May 14	Entered hospital	50	3' 30"	2' 30"			Lost
May 15		25					
May 16		45	2' 30"	2' 30"			9.9
May 17		50					
May 18		0					9.78
May 21	Went home	30					

When she went home on May 21, her condition was much better than when she entered. Just before being discharged from the hospital an injection of 30 units was given, and three days later she called us and reported that the bleeding had stopped entirely. Two weeks later she passed through a normal menstrual period of five days, using eighteen pads, and there has been no bleeding during the last three weeks.

CASE 3.—The patient was thirty years of age and for six years previous to entering the hospital for her first parathormone injection, menstruation had been profuse. The periods lasted six to seven days and on the first and second day they assumed the character of a severe hemorrhage. She usually used twenty-four pads which were well soaked through. Several months before entering the hospital for the parathyroid extract therapy she was curetted, but since that time the periods have been as bad or worse than at any time before.

TABLE III, CASE 3

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.		
May 25	Began	8	3'	2'			9.58		
May 26		30							
May 27		34	1' 30"	1' 20"			11.10		
May 28		30							
May 29	Stopped	25			4½	16			

Total parathormone—127 units, all given subcutaneously.

Rise in blood calcium (after 72 units) 1.52 mg. per 100 c.c. blood.

Remarks: These results so encouraged the patient that she was very anxious to repeat the treatment the next month. It should be noted here that the first injection of the extract was given after the period had already become profuse and that the effect did not become apparent until the worst of the period was almost passed, eleven of the sixteen pads being used during the first forty-eight hours. The greatest amount of hormone that had ever been given to date was used in this instance and it is interesting to note that there was the greatest rise in blood calcium as well as the greatest improvement. The patient stated, emphatically, that she had been stronger and more nearly well between this period and the next one than at any time in months.

June 19	Began	15 subcut.	2' 40"	2'			10.17		
		15 intrav.							
June 20		15 subcut.	1' 30"	1' 40"			4	13	10.46
		15 intrav.							
June 21	Stopped	10 subcut.							
June 22		20 intrav.							

Total parathormone—90 units, intravenously and subcutaneously.

Rise in blood calcium 0.3 mg.

Remarks: The patient declared that this was by far her easiest period. Several of the thirteen pads were almost unsoiled when changed. During the entire time of this period she was crossing the city daily by way of the elevated lines, coming from her home to the hospital and returning, and although her periods were usually made much worse by activity, no effect was produced at this time. She is also convinced that the amount of blood lost with stool and urine was only about one-third the normal loss. The fact that the amount of blood calcium per 100 c.c. at the beginning of this period was considerably higher than at the beginning of the preceding period, suggests the possibility that the calcium rise which follows the parathormone injections may be more nearly permanent than might at first have been expected.

CASE 4.—Menstruation began at the age of ten. The first period was normal, but the second period lasted twenty-one days and all subsequent periods have been profuse. She was first seen in our clinic at the age of eleven. Her blood coagulation time then was 3' 30", which is well within normal limits. She has been in the hospital six times for treatment which included injections of pituitrin, ergot, stypticin, horse serum, and milk. Following the milk injections she had severe reactions and there was some evidence of decrease in the amount of blood lost at the time, but the effect did not last. She is now seventeen years of age, and since January, 1926 the periods have been eight to nine days in length and she has had to remain in bed during the entire time, using from twenty to twenty-nine large homemade pads which are fully twice as heavy as the hospital pads that she used while receiving the parathormone injections.

TABLE IV, CASE 4

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
May 25	Entered hospital	6 subcut.	2' 30"	2'			10.07
May 26		18 "					
May 27		18 "					
May 28	Period began	12 "					
May 29		20 "					
May 30		20 "					
May 31		28 "					
June 1		18 "	2'	2'			10.64
June 2		15 "					
June 3	Stopped	10 "			7	21	

Total parathormone—165, all subcutaneously.

Rise in blood calcium—(after 122 units) 0.57 mg. per 100 c.c. blood.

Remarks: The patient used twenty-one of the small hospital pads, several of which were very slightly soiled. Since she usually used from twenty to twenty-nine large homemade pads, well soaked, we can conservatively estimate that she lost at this period less than one-half as much blood as at other periods.

Following the period just described the patient recovered her strength much more completely and quickly than she ever had done before. Her mother reported that her color was the best since she had first started to menstruate and that she had more vitality and energy during the intermenstrual periods than ever before.

TABLE V, CASE 4

DATE	NOTATION	THERAPY (UNITS)	CLOTTING TIME	BLEEDING TIME	DAYS LASTED	TOTAL PADS	BLOOD CALCIUM MG. PER 100 C.C.
June 21	Entered hospital	0					
June 22		0	2'	3'			10.56
June 23		6					
June 24		0					
June 25	Began to menstruate	15 subcut. 20 intrav.					
June 26		25 subcut.					
June 27		10 subcut. 20 intrav.					
June 28		15 intrav.					10.86
July 1	Stopped				7	18	

Total parathormone—111 units.

Rise in blood calcium—0.30 mg. per 100 c.c. of blood.

NOTE: In this protocol and in all of the others, units of hormone not definitely designated as given by intravenous injection were given subcutaneously.

Remarks: It is interesting to note that the blood calcium of this patient was almost as high at the beginning of this period as it was at the end of the last, and the clotting time was less at the beginning of this period than it was at the beginning of the previous one, before any of the extract had been given.

The patient believes that this period was better than the one of the month before, which was approximately one-half of her usual blood loss, although the blood calcium rise this time was less than that of the preceding period. Both the patient and her mother are quite convinced that the injections have helped her very much and that her physical condition has improved.

It is quite possible that the changes in the clotting and bleeding time following injection of the extract are not due in great part to the actual increase in the calcium content of the blood. The fact that the bleeding time may be reduced to one-half the normal without any appreciable increase in the calcium content of the plasma suggests the possibility that the extract may act by ionizing the calcium or in some other way activating it, thus hastening the formation of the clot.

Kylin² in making a study of the calcium content of blood serum of patients during menstruation found that the concentration of the blood calcium is normally elevated during the menstrual period. In complicating illnesses, as chronic urticaria (one case shown), the converse behavior was observed. The author reported an elevation of the blood calcium concentration of from 0.35 to 2.65 mg. per 100 c.c. during the menstrual period, with premenstrual values of 10.75 to 11.85. Six normal women and two more with complications (bronchitis, subacute and chronic urticaria) were the subjects of the study. It seems reasonable to assume that the contributory factors in the pathology of the cases we have studied may be explained on the basis of failure of the individual to exhibit the normal rise in blood calcium during the menstrual period.

It is possible, too, that the action of the calcium in diminishing the amount of blood lost at each period may be in part explained by the findings of Kylin and Nystrom,³ that calcium injection causes, among other things, a rise in blood pressure, attributable to a vasoconstrictor action similar to that of adrenalin. In this way it may serve to some extent to constrict atonic, oozing vessels in the endometrium enough to promote the formation of a clot.

We realize that nothing is conclusively demonstrated by our work as here reported. Our most encouraging results are purely clinical ones, the interpretation of which depends, to a large extent, upon the intelligence of the patients. Fortunately all of the patients with whom we have worked have possessed more than the average mental capacity. Case 1 was a college graduate, while Case 3 was a teacher in a large university. The other two patients were quite alert, and all were capable of forming an intelligent opinion with regard to their own conditions.

In every instance the patients were encouraged by the results that were attendant upon the parathormone injections. All of them were convinced that their periods were shortened and that the actual blood loss was definitely less than at previous periods. All of them were of the opinion that the intermenstrual interval was characterized by a greater amount of strength, vitality, and energy than they had previously experienced.

The danger of producing a hypercalcemia is very small, even very large doses may be given. One hundred units of the parathormone is the amount which is said to increase the calcium content of a 20 kilo dog, 5 mg. per 100 c.c. of blood. Collip¹ describes hypercalcemia as a condition in which the blood calcium is greater than 15 mg. per 100 c.c. of blood. Assuming that the patient responds as does the experimental animal on a basis of weight, proportionately, more than 300 units would then be required in order to produce a hypercalcemia in a 60 kilo patient whose normal calcium content was 10 mg. or less per 100 c.c. of blood.

We realize that we are still dealing in theories and that the facts are yet to be demonstrated; but while we are not able to state definitely just what were the finer processes which followed the injections of the parathormone, to bring about the clinical results which we have reported, we have been encouraged enough by these results to continue the work with increased zeal.

While no definite conclusions can be formed at this time as to the permanent effect of the parathyroid extract upon such cases as those here described, we are inclined to conclude from our work thus far that the calcium content of the blood, following such doses of parathormone as we have used, does not show the rise reported by Kylin, but that—

1. The bleeding time and clotting time of the blood were definitely shortened.
2. The number of days of menstrual bleeding as well as the amount of blood lost was appreciably reduced.
3. During the intermenstrual period the patients were not so reduced in strength and vitality.

REFERENCES

- (1) Collip, J. B.: Jour. Biol. Chem., 1923, lxiii, 434. (2) Kylin, E.: Ztschr. f. d. ges. exper. Med., 1924, xliii, 50. (3) Kylin, E., and Nystrom, G.: Ztschr. f. d. ges. exper. Med., 1925, xlv, 208. (4) Tisdall, F. F.: Jour. Biol. Chem., 1923, lvi, 439.

We wish to express our thanks and appreciation to Dr. N. Sproat Heaney of Rush Medical College and to Dr. S. A. Matthews, Loyola University Medical School, for their advice and encouragement in the work which we have just described.

THE ORIGIN OF THE COMMON CYSTIC STRUCTURES OF THE HUMAN PLACENTA*

BY RICHARD PADDOCK, M.D., AND E. D. GREER, M.D., ST. LOUIS, MO.

(From the Department of Obstetrics, Washington University School of Medicine and Barnes Hospital)

IN THE laboratory study of the placenta, including both gross and microscopic examination of anomalies and lesions, our attention was directed to the frequency of occurrence of small cystic structures in the placental tissue. Various types of cysts of the placenta have been recognized for some time, but the frequency with which this particular structure occurred arrested our attention, the gross picture being well defined and striking wherever the structure occurred.

Before proceeding further it would be well to take up a generalized gross description of the structures in question. The position is most frequently in the central portion of the placental area where the placental tissue is usually thickest. They are usually located somewhat nearer the fetal surface than the maternal surface. The size is quite variable. Most of the cavities are only a few millimeters in diameter, but in some cases the greatest diameter may exceed 2 cm. In placentae where the cysts are rather numerous the cavities are usually small in size.

The shape is quite irregular; seldom is it spherical. In many instances the cavities present diverticula which are greater in length than the diameter of the main portion of the cavity. The reason for the irregularity in shape will be evident when the microscopic picture is described.

On section of the fixed placenta the circumscribed outline is present. The wall is in most cases a very definite fibrin-like band, a millimeter or less in diameter, and it stands out distinctly from the surrounding tissue. The cavity is filled with a gelatinous opalescent material, sometimes quite clear, and sometimes with a sanguineous tinge. In some cases this material is quite firm, while again it may have the consistency of thin mucus.

The apparent relationship to the surrounding tissue is variable. In some cases the structures seem to be isolated in the villous tissue, again they appear to be in approximation to the chorionic membrane, and very frequently they are found to be in the terminal portion of septa contiguous with the decidua at the maternal surface. (Fig. 1.)

While attention was directed to the macroscopic cystic structures, microscopic cysts were being noted from time to time in sections taken from blocks of apparently normal placental tissue. These small cysts

*Read at a meeting of the St. Louis Gynecological Society, May 14, 1926.

were of the same general appearance as the larger cysts and it was seen that the occurrence was invariably in the tissue constituting the so-called "decidual islands." These decidual islands are normal constituents of the placenta.

There is at present a controversy as to the origin of these decidual islands. Some observers maintain that they are of decidual origin and represent sections through decidual septa, while others take the view that these islands "represent masses of trophoblasts into which the chorionic connective tissue has not grown, and which therefore have not developed into typical villi." (J. W. Williams.)

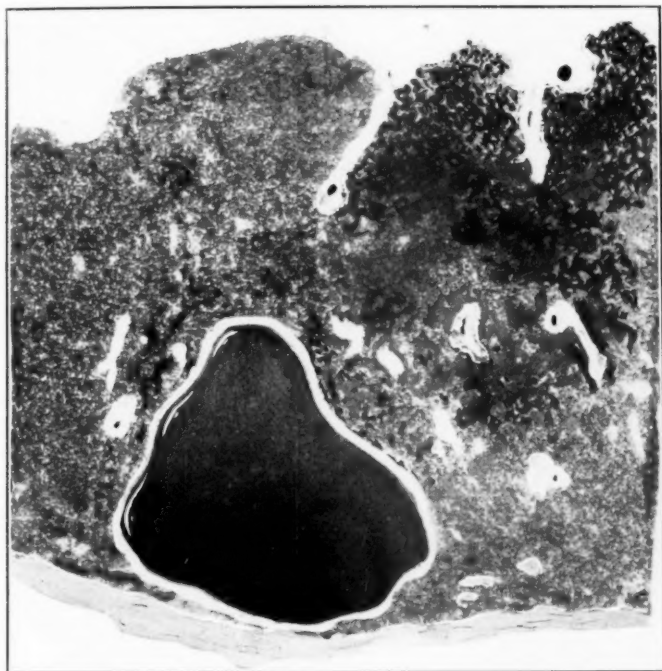


Fig. 1.—Gross section through the placenta showing a large cystic structure filled with gelatinous material and well circumscribed. Lower surface, fetal surface; maternal surface above. Enlarged one and a half times. Courtesy Drs. McNalley and Dieckmann.

In order to determine in which tissues these cysts had their origin, repeated careful observations were made first in the gross tissue, and second, in the microscopic material. It was found almost invariably true that when repeated sections of the tissue containing the cysts were taken at intervals of a few millimeters, the cysts were found to be in septa of tissue contiguous with the decidual tissue at the maternal surface of the placenta.

Turning now to the microscopic picture presented on study of numerous sections through these cystic structures, we obtain a typical picture as follows: Projecting into, or surrounded by the villous

tissue of the placenta is seen an area of tissue markedly different in appearance. Separating this area from the surrounding villi is a pink-staining band of canalized fibrin, identical with the Nitabuch's fibrin layer at the junction between the fetal and maternal tissue. This fibrin layer may extend outward and surround adjacent villi and decidual tissue with the concurrent picture of white infarction in this area. Eden has pointed out that retrograde changes of decidual



Fig. 2.—Lab. No. 5900. Low power picture of placental section including a decidual septum contiguous with the decidua at the maternal surface. Near the terminal portion and central portion of septum the cystic changes are taking place. In the extreme left lower corner can be seen a portion of the so-called "decidual island," also undergoing degenerative change.

tissue in the placenta are of considerable importance in the white infarct formation.

Internal to the outer fibrinous band is usually a thicker layer of degenerating tissue. This depends greatly on the size of the entire structure and the age and advancement of the process. The tissue

takes a deeper stain with eosin and the cellular structure can be made out. In most cases this can be identified as degenerated or degenerating decidual tissue. In many cases where the cystic formation is only beginning in the central portion, this tissue is almost identical in appearance with the decidual tissue at the maternal surface. (Fig. 2.)

Internal to the decidual tissue and invading the decidual tissue is found another type of cell. These cells are larger, deeper staining cells than the decidual cells. They are epithelioid in appearance. They usually appear in groups or clumps. The nuclei are large and deep staining, the protoplasm is granular. In a number of sections two nuclei could be found in each of a number of cells. No mitotic figures were observed in any of the cell groups. They are well defined and in their groups intercellular spaces can be seen. Where

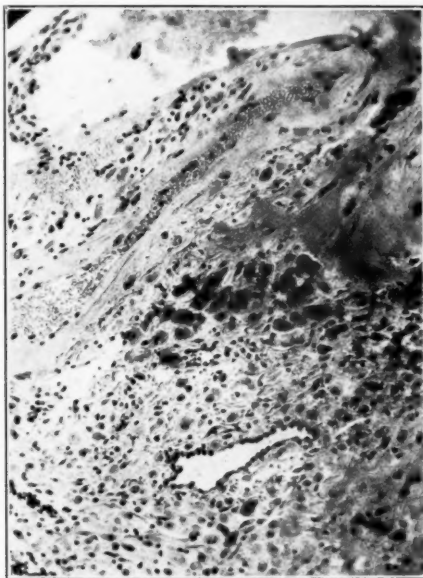


Fig. 3.—Lab. No. 5900. High magnification of a portion of the decidua at the maternal surface. In the center of the field are seen a number of deeper staining, well-defined cells,—the trophoblastic cells.

they invade the surrounding tissues they often seem to be in spaces giving the appearance of "cartilage cells." This latter appearance has been described at one time or another by various observers. We believe these cells to be of trophoblastic origin. They are not syncytial cells, as can readily be determined by their appearance and arrangement. These cells are identical with the cells found invading the decidua, other than the syncytial cells, throughout pregnancy. They are very similar to the other type of cell in chorioepithelioma, and are almost identical to the rapidly proliferating cells seen in the villi in cases of hydatid mole. They are most probably the same cells as Langhans' cells. (Figs. 3 and 4.)

On account of the similarity between the cells of the chorion and the decidual cells at term, there has been much confusion in regard to the origin and identity of many of the cells seen in some of the pathologic conditions. (Fig. 5.)

The deeper staining cells, which we believe to be of trophoblastic origin, are apparently quite invasive. Wherever they appear, either in the decidua proper or in these cystic septa, there is adjacent tissue destruction. This is probably the chief reason for the degenerated appearance of the tissues adjacent to them. By observing many sections containing the cystic formation in various stages of develop-



Fig. 4.—Lab. No. 5900. Higher magnification of the small "decidual island." Here the outer fibrin can be seen. Inside this is the degenerating decidual tissue which has been invaded by the active deep staining cells in the central portion of the field. The central substance is beginning to be formed at the upper end of the cavity.

ment, it appears that these cells start at some region in the decidual septa and proliferate, digesting or liquefying the tissues before them. This process evidently starts rather early in the development of the placenta as we have been able to find such cystic structures in placenta as early as twenty weeks of gestation.

The cystic cavity is filled with the material described in the gross. This material takes a rather uniform light pink stain and is quite similar in appearance to the colloid found in the thyroid. It is rather

homogenous on superficial inspection. Previous observers have called attention to the appearance of colloid in the placenta. Although we have never found accurate descriptions of the entire structure as an entity, we have found references to material which was probably the material contained in the structures. This is also spoken of as "fibrin masses," "finely granular plasma masses," "liquefaction necrosis," and "hyalinization."

Although the general appearance of the substance is homogenous, closer inspection shows some variation in structure. Centrally it appears less dense, taking a somewhat lighter stain. Toward the margins small irregular-shaped masses of a trifle deeper staining reaction

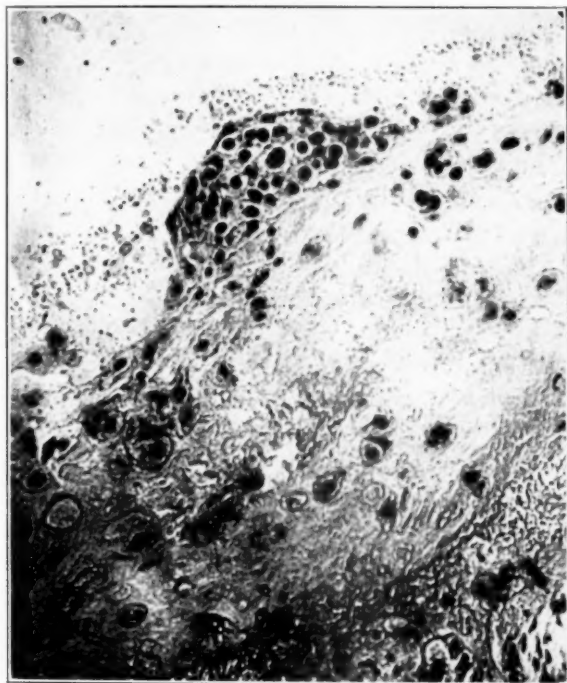


Fig. 5.—Lab. No. 6133. Section through wall of advanced cystic structure. Note group of trophoblastic cells in upper portion of the field, extending into the rather granular substance contained in the cavity. Beneath the cell group is the canalized fibrin containing a few trophoblastic cells and degenerating decidua cells. This outer fibrin layer in the lower portion of the field forms part of an adjacent white infarct.

are seen. Included in this central substance red blood cells are sometimes seen. Never have we found any nucleated red cells, as would be expected if these blood cells were of fetal origin. Again, some cellular debris may be seen, probably degenerating cells from the surrounding tissues. Figs. 4 and 5 show the appearance of the central material.

The question arises as to the composition of this material. One wonders whether it may be properly called colloid or hyaline. Owing

to its appearance, its staining quality with eosin, and its apparent production by the trophoblastic cells which are epithelial, we are inclined to believe that it may correctly be called colloid. With orcein and van Gieson's stain it also takes a light yellow-brown stain. We are at present working on the chemical and physiologic natures of this material. The results of this work may shed considerable light on the nature of the material.

There is much variation from this typical microscopic picture. The variation is undoubtedly due to the size of the decidual tissue in which the change takes place, to the age of the placenta, and to the degree of activity and number of the trophoblastic cells present. In many cases smaller portions of the decidual tissue show the least degree of invasion by the trophoblastic cells. It is usually true that the larger areas of decidual tissue show the cystic structure most distinctly. It is very unusual to find any comparatively large portions of decidual tissue in the placenta that do not show the trophoblastic invasion and definite cystic formation.

As the process goes on to the picture of an advanced stage the decidual cells may practically disappear, either forming a part of the canalized outer wall, or being digested to form the central gelatinous substance. This leaves the trophoblastic cells the only well-defined cell structures seen in the picture. These trophoblastic cells are also reduced in number by degeneration. The ultimate picture seen in a few cases in late placentas is a cystic structure with fibrinous walls containing a homogenous or very finely granular light pink-staining material.

Considerable difficulty is experienced in the preparation of microscopic sections due to the partial solubility of the gelatinous material in alcohol. There is considerable shrinkage with the partial precipitation of the more insoluble material about the walls of the cavity. This is especially true where rather advanced changes have taken place.

The frequency of the structure we have determined by going over a large series of placentas for the past several months. We have included those cases in which the structure was identified in the gross, or later on microscopic section alone. Wherever the structure appeared in the gross, sections were made for microscopic study. Our series includes 1965 placentas. In this series the structure was identified 290 times. The series included mainly full-term placentas, but quite a few premature placentas as well as placentas from miscarriages were obtained.

From the above figures it is seen that the frequency in our series was very nearly 14.1 per cent. We believe, however, that the structure is probably present in microscopic degree in nearly all cases. If almost any placenta is sectioned repeatedly, some sections will be

found to contain these areas of decidual tissue undergoing the changes we have described. It is probable that some factor in development determines the size and number of the areas.

The structures we have described are seen to be constituents in a rather large number of white infarcts. In fact, wherever these structures occur there is more or less adjacent white infarction. It would seem that these structures have a definite part in the process of white infarction. As we have previously mentioned, other observers have called attention to changes in decidual tissue constituting portions of white infarcts, and probably being of considerable importance in white infarct formation. Since marked white infarction and toxemia are so frequently associated, we have reviewed the cases in our series to see whether the occurrence of the cystic structures bears any association to maternal disease.

For this clinical review we have divided our series into two groups; namely, those in which the structures were seen in the gross as well as microscopically, and those in which the structures were found microscopically alone.

We have eliminated from the clinical study those cases in which the data were insufficient, except where definite pathologic conditions were known to exist. Especial attention has been paid to blood pressure, urine findings, physical findings, outstanding symptoms, and to the condition of the children during their stay in the hospital. The minor and transient complaints of the average patients have been disregarded. Since, in going into this survey we had no opinion on what the findings might be, we were able to tabulate the data without the influence of any preformed conclusions.

The accompanying tables (I and II) show the relationship between the number of cases with hypertension and albuminuria to the total numbers in each group, both in the primiparous and in the multiparous patients. The blood pressures were taken at the maximum before the onset of labor, and in most cases represent the values obtained in the dispensary or office some time during the course of prenatal care. The urine specimens were also taken some time before the onset of labor, usually during some prenatal visit.

From inspection of the tables it is seen that a rather large percentage of the cases observed ran a blood pressure over 130 some time during pregnancy. This point, however, is not outstanding and we do not feel that it should be emphasized.

Out of 231 cases in which the structure was identified in the gross and microscopically there were eight premature deliveries, eleven stillbirths, and five infant deaths. Out of 51 cases in which the microscopic structure alone was identified there was one abortion, three premature deliveries, two stillbirths, and two infant deaths. We do

TABLE I
PRIMIPARAE

	BLOOD PRESSURE					TOTALS
	Under 130	130-140	140-160	160-180	180-200	
	45 14	21 12	11 4	2 2	1 1	
Albuminuria						80 33
Cases in which structure was found microscopically only						
Albuminuria	8 5	4 0	0 0	0 0	0 0	12 5

TABLE II
MULTIPARAE

GRAVIDA	TOTALS	BLOOD PRESSURE					ALB. IN URINE
		Under 130	130-140	140-160	160-180	180-200+	
II. Micro alone	37 11	20 8	9 1	6 1	2 0	0 1	8 3
III. Micro alone	22 6	10 4	8 2	3 0	1 0	0 0	3 1
IV. Micro alone	12 2	8 2	2 0	1 0	1 0	0 0	6 1
V. Micro alone	5 3	2 1	2 0	1 2	0 0	0 0	1 0
VI. Micro alone	7 5	6 3	1 1	0 0	0 0	0 1	0 1
VII. Micro alone	2 3	1 1	0 1	1 0	0 1	0 0	0 3
VIII. Micro alone	2 0	0 0	0 0	0 0	0 0	0 0	2 0
IX. Micro alone	2 0	2 0	0 0	0 0	0 0	0 0	0 0
X. Micro alone	4 0	1 0	1 0	1 0	0 0	1 0	1 0
XII. Micro alone	1 1	1 0	0 0	0 1	0 0	0 0	0 1
XIV. Micro alone	0 1	0 1	0 0	0 0	0 0	0 0	0 0
XVIII. Micro alone	0 1	0 0	0 0	0 1	0 0	0 0	0 1

not feel that these are particularly significant figures, for many cases from which we obtained placentas were sent into the hospital because of complications of pregnancy or labor.

In order to make the study complete we present the important maternal abnormalities occurring in our series. They are as follows:

- 36 Cases showing enlargement of the thyroid. One had previous thyroidectomy.
- 4 Cases of tuberculosis, chronic.
- 1 Case of tuberculosis, acute.
- 8 Toxemias: 1 eclampsia; 4 preeclamptic toxemias, and 3 other toxemias not classified.
- 1 Peritonitis with pregnancy.
- 1 Hysteria with pregnancy.
- 1 Pyelitis.
- 2 Cases of myocarditis, chronic.
- 3 Cases of hydramnios.
- 1 Placenta previa.
- 1 Acute appendix.
- 1 Diabetic.
- 1 Vomiting of pregnancy.
- 12 Syphilitic mothers.

It is seen that the above list includes a diversity of conditions, none of which probably have origin in the structure under consideration.

CONCLUSIONS

From our study of this series of cases we arrive at the following conclusions:

1. The so-called decidual islands of the placenta are maternal in origin and are portions of decidual septa.
2. The cystic structures that we have described have their origin in decidual tissue and are formed by the action of trophoblastic cells on decidual tissue.
3. These structures are always associated with some degree of white infarction, and are in all probability the cause of the white infarcts with which they are associated.

REFERENCES

- Eden, T. W.*: Jour. Path. and Bacteriol., 1896, iii, 449. *Eden, T. W.*: Jour. Path. and Bacteriol., 1897, iv, 265. *Farre*: Arch. f. path. Anat., etc., 1890, exx, 460. *Gottschalk, S.*: Arch. für Gynaek., 1890, xxxvii, 251. *Gottschalk, S.*: Arch. für Gynaek., 1891, xl, 169. *Jacobson, F.*: Ztschr. f. Geburtsh. u. Gynaek., 1890, xx, 237. *McNalley, F. P., and Dieckmann, Wm. J.*: AM. JOUR. OBST. AND GYNEC., 1923, v, 55. *McNalley, F. P.*: AM. JOUR. OBST. AND GYNEC., 1924, viii, 186. *Meola, Felice*: Ann. di ostetricia e ginecologia, December, 1891. *Nitabuch*: Beiträge zur Kenntniss der menschlichen Placenta, Bern, 1887. *Post and Welch*: Trans. Am. Assn. Obst. and Gynec., 1888, i, 460. *Rohr, K.*: Virchows Arch. f. Path., Anat., etc., 1889, exv, 505. *Rossier, G.*: Arch. für Gynaek., 1888, xxx, 401. *Strachan, Gilbert L.*: Jour. Obst. and Gynec., Brit. Emp., 1923, xxx, 611-642. *Williams, J. Whitridge*: Obstetrics, Ed. 5, 1925, New York, D. Appleton & Co.

CARCINOMA OF THE CERVIX UTERI, A CLINICAL AND PATHOLOGIC STUDY

BY C. F. FLUHMAN, M.D., C.M., SAN FRANCISCO, CALIF.

(From the Department of Obstetrics and Gynecology, Stanford University School of Medicine)

MICROSCOPIC examination of malignant tumors of the cervix has revealed certain well defined variations and there have been many classifications evolved on this basis. None, however, are totally satisfactory, as the exact relation of the various groups with the clinical phenomena has not been fully established. Many data have been published relating to the importance of this work in its application to the treatment with radium and x-ray, but the lack of uniformity in results and the absence of a standard classification show the need for further study. The following paper represents an attempt to analyze the histopathologic findings in a series of cancer of the cervix and to correlate them with certain clinical features present.

It is regrettable that there should be so much confusion in the literature regarding the terminology in the various types of carcinoma of the cervix uteri. There is great variance both in the appellation and in the number of methods of grouping in vogue. Not only are these means different when evolved on separate grounds, such as tissue of origin, general arrangement of tumor, etc., but even classifications supposedly on the same basis show marked differences. Recent studies suggest that the most practical way to classify cancer of the cervix from its microscopic appearance is to use the individual cell itself as a point of departure. This method does not consider the actual origin of the cell—whether it be from squamous or cylindrical celled epithelium (a differentiation that may be very difficult indeed to establish), but is based purely on its morphologic appearance. Even this is not without its disadvantages, for not only must the individual tumor cell be studied but certain of its local and general tissue relations necessarily are forced into consideration. In this study an adaptation of the excellent classification evolved by Schottlaender and Kermauner¹ and now in general usage in the German literature and adopted in one form or another by many American writers, has been employed. The cases of cervical cancer have been divided into two main groups, (A) adenomatous, and (B) solid. The solid again have been subdivided into: (a) ripe, (b) midripe, (c) unripe. The actual terms employed in the subdivision are rather unfortunate, implying as they do an embryologic process, but they have been kept rather than suggest any addition to an already overburdened terminology.

Solid tumors have been designated as ripe where the general appearance of the tissue shows a well defined resemblance to normal squamous epithelium, when prickle-cells are present and there is definite evidence of cornification (Fig. 1). The unripe, or immature, cancers of the cervix represent the largest group. In this type of tumor, the cells show no resemblance to any tissue of origin; the cell outlines cannot be clearly made out; the nuclei show great variation in both size and shape, although they are generally small and oval, round or spindle shaped; they are rich in chromatin and stain very deeply with hematoxylin; cornification is very rare; and in their general arrangement the cells are in nests, bands or diffusely scattered



Fig. 1.—(Spec. No. 8592.) Mature type of cancer of the cervix uteri. Low power.

(Fig. 2). The midripe tumors occupy a position halfway between the other two forms and in this group necessarily fall a large number of tumors which do not show a sufficiently mature appearance to be classed as ripe, and also those which show such uniformity and high development of cells as to be considered a more mature type than the unripe. The characteristic appearance of this tumor, however, is said to show cells typically polygonal in shape and fairly regular in size, the outlines are visible, the cytoplasm is pale staining, while the nuclei also do not stain as deeply as in the unripe variety and cornification may or may not be present (Fig. 3).

In the adenomatous group have been placed those tumors showing definite glandular formations as the main feature of the cancer and eliminating those forms of unripe tumors which represent degenera-

tive processes and are designated by some writers as "adenoid" and "cystic." No case of true "adenoma malignum," or, as suggested by Spencer,¹ "carcinoma adenomatodes," was noted. Owing to the small number of cases in this series no further differentiation was used, although the classification described by Frankl and Kraul,² who subdivide their cases into ripe, midripe and unripe according to the development of the glands and the amount of epithelial proliferation, is worthy of consideration.

The actual study and classification of individual tumors is not altogether easy and many forms are very difficult to classify satisfactorily but the vast majority will be found to fall into one or other of the

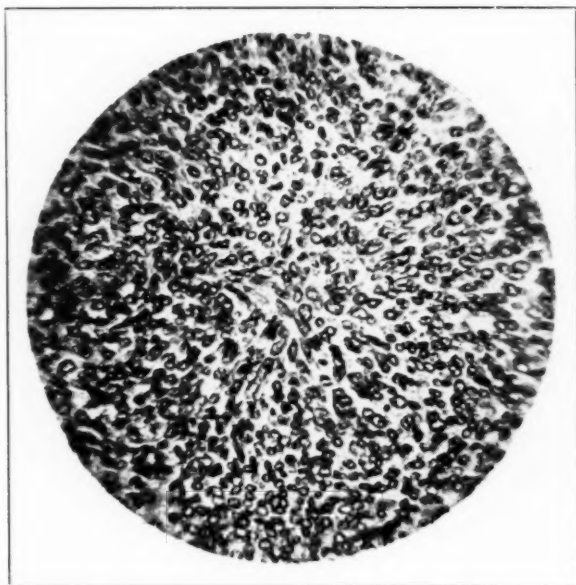


Fig. 2.—(Spec. No. 8831.) Cancer cells of "unripe" type. High power.

above mentioned groups. Biopsy specimens at times are so small that although a diagnosis of cancer is established, its classification may be impossible. Then too, the mixed forms, to be described in detail below, may offer difficulties and lead to faulty classification. However, although the error is quite possible, it is not likely to occur frequently as in this study where a total specimen of the uterus or repeated biopsies were available it was found that even in the mixed tumors one type of cancer cell definitely predominated.

The material studied was obtained from a series of 110 patients with carcinoma of the cervix who presented themselves for treatment at the Stanford Clinic during the past ten years. These have been taken consecutively, eliminating only those in whom clinical

data was lacking or the pathologic material was insufficient or unsuitable. Twenty-three patients had had hysterectomy and consequently sections from various parts of the uterus were available for study. The remainder were biopsy specimens but in thirteen cases there were two or more taken at different stages of the disease. No specimens taken after cauterization, radium or x-ray exposure were used in the grouping of the cases.

Of the 110 specimens studied, it has been found that 6 or 5.4 per cent were of the adenomatous type and 104 or 94.6 per cent were

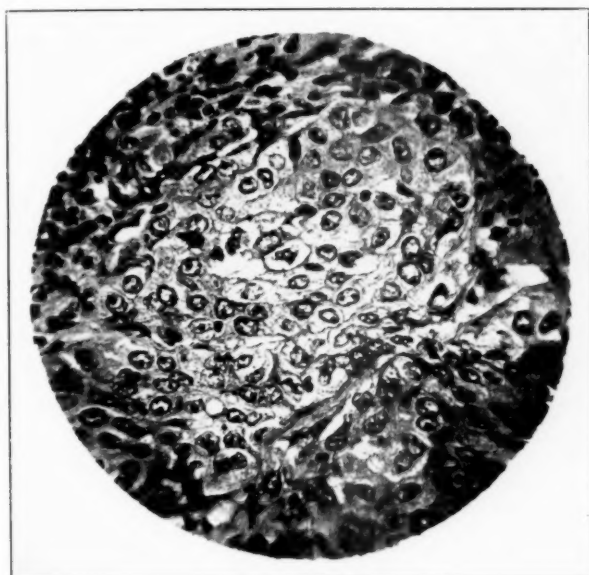


Fig. 3.—(Spec. No. A-185.) "Midriple" cells in cancer of the cervix uteri. High power.

solid cancers. The solid, again, showed the following incidence as compared with figures cited by certain German writers:

TABLE I

	NUMBER OF CASES	RIPE	PER CENT MIDRIPE	UNRIPE
Stanford Clinic	104	24.0	29.8	46.2
Schottlaender and Kermanner	115	10.5	42.1	47.4
Ballin ²	385	19.8	39.5	40.5
Frankl and Kraul ³	1002	7.5	27.5	65.0

The occurrence of cornification, with or without completely developed "cancer pearls," was noted in all the ripe cases, and in 17 or 54.8 per cent of the midriple. It has thus been considered as an evidence of maturity, although this is not infallible, as two sections

of a definitely immature tumor showed pearl formation. This fact has been noted before by Adler,⁶ and Krompecher² in his monograph on *Basal-cell Carcinoma of the Uterus*, remarks on five cases of basal-celled carcinoma with pearls (in a series of 216) to which he gives the name of "Parakeratotic."

Attention was paid especially to "mixed tumors," that is, specimens in which indubitable groups of cells of different maturity were found in the same specimen. The importance of this in regard to the possibility of a faulty diagnosis in examining biopsy sections and also in determining radium dosage has been mentioned many times before, among others by Schottlaender and Kermauner,¹ Schmitz,⁷ Klemperer,¹⁰ and Adler.⁶ Martzloff,^{11, 12} although using a slightly different classification, found mixed forms occurring in 129 cases in a series of 387 patients. Thirty-five or 32.1 per cent of the sections in this series showed the presence of mixed forms, as follows:

Ripe—with unripe areas	2	{ 12% of ripe tumors
with midripe areas	1	
Midripe—with unripe areas	4	{ 38.7% of midripe tumors
with ripe areas	5	
Unripe—with midripe areas	13	{ 39.5% of unripe tumors
with ripe areas	2	
with both ripe and mid-ripe areas	4	
Adenomatous with unripe nests	2	

Only the cases which showed very definite areas or nests of different maturity were used in this classification. A few presented some difficulty as to which group they belonged but in the vast majority of the cases, one type of cell very definitely predominated. The adenomatous tumors noted with unripe areas would supposedly have been classed by Schottlaender and Kermauner as "primary glandular, secondary solid," and by Frankl and Kraul as "unripe adenocarcinoma."

Leucocytic infiltration, composed of lymphocytes, polymorphonuclear leucocytes and plasma cells, was noted in varying degrees in all cases with the exception of two mature cancers and three midripe. Mitotic figures were not analyzed in detail, but it is interesting to note that Palugyay¹³ recently found that the histologic division of cancer of the cervix according to maturity is borne out in cytologic studies. Owing to the importance attributed by Lahm^{14, 15} to the presence of eosinophiles in establishing a prognosis in radium treatment, special attention was paid to their occurrence. They were noted in very small numbers in eighteen cases and to a greater extent in eight others. In thirteen or 11.9 per cent of the specimens, however, (ripe 3, midripe 4, and unripe 6) they were present in excessive

numbers (Fig. 4), and could be found not only throughout the connective tissues but also among the individual cancer cells.

Several writers, notably Schottlaender and Kermauner,¹ Ballin⁵ and Frankl and Kraul³ have found in their series that the riper types of cancer of the cervix were present more frequently in the older patients and the immature in the earlier years. It has also been stated that adenocarcinoma occurs more often later in life. The findings of this series are charted in Table II and it will be seen that the figures do not bear out the above conception. The greatest incidence for all types was observed to be between forty and fifty years of age, with 39.1 per cent of cases falling in this group and the next

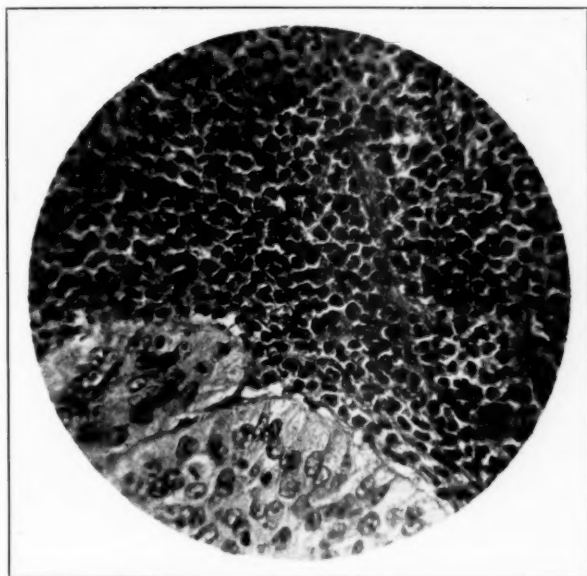


Fig. 4.—(Spec. No. A-185.) Marked infiltration with eosinophilic cells. "Midripe" type of cancer cells. High power.

decade ranking second with 22.7 per cent. In studying the figures for the groups of different maturity, it will be found that they each more or less coincide with the totals for the whole series and the mature forms far from being less prevalent show a slightly greater percentage in the earlier years than either of the other two solid cancers. Owing to the few adenocarcinomata in the series, it is felt that no conclusions can be drawn from them.

In order to determine to what stage the disease had progressed when patients were first seen, they were classified from the clinical examinations according to the five groups of Schmitz⁷⁸ classification, namely:

- I. Disease limited to the cervix.
- II. Doubtful, but probably limited to the cervix.
- III. Involvement of vaginal walls or parametria.
- IV. Hopelessly advanced cases.
- V. Cancer in the stump of the cervix following previous supravaginal hysterectomy.

The terms "operable" and "inoperable" have been avoided as they are not truly descriptive and the conditions present may vary according to the individual examiner's conceptions of what constitutes an operable or inoperable case.

TABLE II
AGE INCIDENCE

AGE	RIPE		MIDRIPE		UNRIPE		ADENOMATOUS		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
20-30	0		0		1	2.1	0		1	0.9
30-40	6	24	4	12.8	10	20.8	2	33.35	22	20.0
40-50	11	44	11	35.5	19	39.6	2	33.35	43	39.1
50-60	6	24	6	19.4	12	25.0	1	16.65	25	22.7
60-70	2	8	9	29.0	6	12.5	1	16.65	18	16.4
70-80	0		1	3.3	0		0		1	0.9

It was then found (see Table III) that 31 patients, namely, 28.1 per cent, belonged to Groups I and II and the balance, namely, 79 or 71.9 per cent were advanced cases. Of the former there were: ripe, 8 cases or 32 per cent; midripe, 9 cases or 29 per cent; and unripe, 11 cases or 22.9 per cent, which showed that on admission the disease was limited to the cervix, thus showing a definite superiority in the case of the maturer forms. This per se cannot be taken as definite evidence that the mature forms are less malignant than the other types as there are other factors which must come into consideration, among which duration of the disease is of the utmost importance. However, in a comparatively long series of cases these factors tend to more or less balance one another and so if any one group should present a larger proportion of early cases than the others this fact may be considered as an important piece of evidence that it is slower-growing and less malignant. If so, then the above study tends to show that the immature types of cancer of the cervix are more malignant than the mature forms, a conception held by many writers (Schottlaender and Kermauner,¹ Frankl and Kraul,² Schmitz,⁷ Ward and Farrar,¹⁰ Martzloff^{11, 12}).

TABLE III
EXTENT OF DISEASE ON ADMISSION

	RIPE		MIDRIPE		UNRIPE		ADENOMATOUS		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Limited to cervix	8	32	9	29	11	22.9	3	50	31	28.1
Advanced	17	68	22	71	37	77.1	3	50	79	71.9

From its clinical appearance cancer of the cervix may be described as having three manifestations (Ewing¹⁷). The first, characterized by an excavated ulceration, is the most common, and was found to occur in 51.9 per cent of the 102 cases of this series for which a complete description of the clinical aspect was obtainable. The second form, in which there is extensive induration and swelling of the cervix, was present in 22.6 per cent of the total. The third type, which exhibits papillary or cauliflower outgrowths, occurred in 25.5 per cent of the patients. Table IV shows the occurrence of these lesions in the different pathologic groups, and it is at once apparent that there is no relation between the two. Each of the pathologic groups is represented in the three clinical divisions in about the same ratio as the figures quoted above for the total, with the single exception that none of the adenomatous tumors showed cauliflower outgrowths. Thus it can be definitely stated that in the histopathologic classification of carcinoma of the cervix uteri there is nothing distinctive in regard to its clinical appearance. From the examination of a patient it is impossible to estimate what the microscopic picture will demonstrate.

TABLE IV
CLINICAL ASPECTS OF TUMOR

	RIPE		MIDRIPE		UNRIPE		ADENOMATOUS		TOTAL	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Ulceration	12	52.2	17	56.7	19	44.2	5	88.3	53	51.9
Induration	5	21.7	8	26.7	9	20.9	1	16.7	23	22.6
Cauliflower	6	26.1	5	16.6	15	34.9	0		26	25.5
Total cases	23		30		43		6		102	

A series of charts were drawn up in an attempt to establish some relation between the duration of symptoms and the extent of the disease in each of the groups. The patients were divided into eight sections, according to the length of time during which they had had manifestations of the disease prior to admission. Figures regarding duration of symptoms for the early and for the advanced cases were obtained in each of the pathologic groups. It was hoped that some conclusions could be obtained particularly from the group of early cases since they could be considered as representing the disease at about the same stage. The figures point to but one conclusion, namely, that the extent of the disease cannot possibly be estimated by the period during which the patient has had symptoms, and that applies to any or all of the pathologic groups. There is no way of telling at what stage of the disease symptoms will appear. To account for the great disparity sometimes seen it seems likely that the rate of growth in these tumors, even when they present either a similar clinical appearance or a similar histopathologic picture, must vary in different individuals.

As stated in the introduction to this paper, the practical importance of classifying carcinoma of the cervix according to the predominating type of cell is in regard to its treatment with radium. The majority of writers among whom may be mentioned Schmitz,^{7, 9} Alter,^{18, 19} Ward and Farrar,¹⁶ and Böhm and Zweifel,²⁰ are in accord that this type of tumor follows the law of Bergonier and Tribondeau, that is, that the more immature the cell the greater is its sensitiveness to the action of rays. However, this view is still controversial and has met with opposition. W. Lahm¹⁴ while stating that the radiosensibility of the cells of cancer of the cervix grouped according to maturity varies, advises the use of higher dosage in the unripe forms. Adler⁶ found that the poorest results were obtained in the adenocarcinomata and the most favorable with the fully mature solid types. It is worth noting, however, that the series Adler reports includes not only cancer of the cervix but all forms of cancer occurring in the pelvis, and he does not differentiate his cases according to the extent of the disease. It would seem to be of the utmost importance to do this since in considering a large group so many in advanced stages are of the unripe variety. Pomeroy and Strauss²¹ reporting a series of one hundred cases, believe that the adenocarcinomata and the solid "spinal cell type with pearls" which apparently are maturer forms, give better results with radium.

In the present series, somewhat less than half of the cases have been treated with radium and present sufficiently complete histories to use in this regard. It is felt, therefore, that the number is too small from which to draw positive conclusions. However, analysis points definitely in one direction and they are briefly mentioned here as a matter of record. Seventeen of the cases showed the disease limited to the cervix as follows: adenomatous, two; ripe, six; midripe, three; unripe, six. Of these, eleven cases were found alive and free from disease at periods varying from one to nine years after treatment. The balance have either died or showed evidence of carcinoma on examination several months later. Of the ripe variety, only two are well, the other four showing disease extended; of the midripe, two are well; of the unripe, all are free from any evidence of recurrence, while of the adenomatous, one is well. With the advanced cases, very discouraging results have been obtained in each group, but the patients having immature types of cancer cells seem to have a longer life and to be free of symptoms for longer periods than the mature forms. This evidence is taken to support the conception that the radiosensibility of the unripe cancer cells is greater than the ripe.

Of all the patients treated with radium, eight showed marked eosinophilia in pathologic sections. Five of these were in patients who were found free of symptoms following radium treatment at thirteen months, three and one-half years, four years, five years and nine years

respectively. The other three cases, however, did very badly. The presence of large numbers of eosinophiles, especially in the unripe cancers of the cervix, may be a favorable sign in the prognosis during treatment by radiation, but further evidence is essential.

SUMMARY

1. A series of 110 cases of carcinoma of the cervix uteri have been studied.

2. On histopathologic examination of operative and biopsy specimens they were classified into two main groups: (A) adenomatous, and (B) solid. The solid were subdivided according to the predominating type of cancer cell into (a) ripe, (b) midripe, and (c) unripe.

3. Adenomatous tumors represented 5.4 per cent of the total, and 94.6 per cent were solid. Of these, 24 per cent were of the ripe, 29.8 per cent of the midripe and 46.2 per cent of the unripe varieties.

4. Cornification occurred in all the ripe tumors and in 54.8 per cent of the midripe, but in only two of the unripe.

5. Mixed tumors were found in 32.1 per cent of the cases in this series.

6. Eosinophilia was present to a marked degree in 11.9 per cent of the sections examined.

7. No relation between the age of the patient and the type of tumor could be established.

8. The disease was limited to the cervix in 28.1 per cent of cases.

9. A larger proportion of cases found in the early stages at first examination were of the ripe variety than of any other group.

10. The typical appearance of cancer of the cervix on clinical examination is either (a) ulceration, (b) induration, or (c) cauliflower-like outgrowth.

11. There is no relation between the clinical appearance of carcinoma of the cervix uteri and the histopathologic groups.

12. It is impossible to determine the extent and duration of the disease from the length of time that symptoms have been present.

13. The radiosensibility of the different pathologic groups is still controversial. Evidence is given supporting the conception that the immature forms do better with radium.

14. The presence of large numbers of eosinophiles in microscopic sections of carcinoma of the cervix may be a favorable prognostic sign when treatment with radium is employed.

Due acknowledgment is made to Dr. A. B. Spalding for valuable assistance and suggestions and to Mr. Pierre Lassègues for the technical work.

REFERENCES

- (1) *Schottlaender, J., and Kermanner, F.*: Zur Kenntnis des Uteruskarzinoms, Berlin, 1912, S. Karger. (2) *Krompecher, E.*: Ztschr. f. Geb. u. Gynäk., 1919, lxxxi, 299. (3) *Frankl, O., and Kraut, L.*: Wien. med. Wchnschr., 1925, lxxv, 1285. (4) *Spencer, H. R.*: Proc. Roy. Soc. Med., 1926, xix, 67. (5) *Ballin, L.*: Zentralbl. f. Gynäk., 1926, l, 214. (6) *Adler, L.*: Zentralbl. f. Gynäk., 1916, xl, 673. (7) *Schmitz, H.*: AM. JOUR. OBST. AND GYNEC., 1925, ix, 644. (8) *Schmitz, H.*: AM. JOUR. ROENTGENOL., 1920, vii, 383. (9) *Schmitz, H.*: AM. JOUR. ROENTGENOL., 1923, x, 781. (10) *Klemperer, P.*: AM. JOUR. OBST. AND GYNEC., 1925, ix, 619. (11) *Martizloff, K. H.*: Bull. Johns Hopkins Hosp., 1923, xxxiv, 141. (12) *Martizloff, K. H.*: Northwest Med., 1926, xxv, 127. (13) *Palagay, J.*: Ztschr. f. Krebsforsch., 1925, xxii, 251. (14) *Lohm, W.*: Arch. f. Gynäk., 1922, cxvii, 264. (15) *Lohm, W.*: Klin. Wchnschr., 1922, xii, 1714. (16) *Ward, G. G., and Farrar, L. K. P.*: AM. JOUR. OBST. AND GYNEC., 1926, xi, 439. (17) *Ewing, J.*: Neoplastic Diseases, Philadelphia, ed. 2, 1922, W. B. Saunders Co., p. 544. (18) *Alter, N. M.*: Jour. Med. Res., 1919, x, 241. (19) *Alter, N. M.*: Jour. Med. Res., 1920, xi, 439. (20) *Böhm, and Zweifel, E.*: Zentralbl. f. Gynäk., 1926, l, 39. (21) *Pomroy, L. A., and Strauss, A.*: Jour. Am. Med. Assn., 1923, lxxxiii, 1060.

STANFORD HOSPITAL.

INIENCEPHALUS, WITH THE REPORT OF A CASE

BY W. E. WELZ, M.D., F.A.C.S., AND B. L. LIEBERMAN, B.S., M.D.
DETROIT, MICH.

FETAL monstrosities are always a source of scientific curiosity, but when they tend to modify the course of labor, they assume practical import the gravity of which varies with the degree of dystocia produced.

For this reason, we take the liberty of reporting a case of inienecephalus, which not only occupies the position of being a very rare type of monster, but also presented itself as a complicated problem when delivery was attempted and effected.

Inienecephalus, or fetus retroflexus, is a very rare condition, having been first definitely described by Saint-Hilaire in 1836, at which time only three cases had been reported. Lewis, in 1897, reviewed twenty-five cases collected from the literature. Ballantyne, in his "Manual" published in 1904, records seven cases. In 1925 Dorland reviewed the literature recording ten additional cases; Burton (1897); Hirst (1897); Abbot and Lockhart (1905) three; Hunziker (1911); Vollois (1914); Wheeler (1918); Michel (1919); and Hayes (1922); to which he added one case of his own and two others present in Chicago, making a total of 38 cases.

Inienecephalus is generally grouped by Schwalbe and others, in the class of rhachischises; characterized by a fissuring of the spinal column. There are three cardinal features of this type of deformity:

1. Backward displacement of the head and a posterior bending of the spinal column.

2. Varying degree of spina bifida affecting the upper spine.
3. Defect in the posterior portion of the skull in the region of the foramen magnum.

Commonly there is a cleavage of the occipital region of the skull and fusion of the exoccipitalis with the vertebrae. The neural arches are ununited to a varying degree (Fig. 4). Hayes called attention to the fact that the brain is displaced downwards, due to a shortening of the craniovertebral axis with the formation of a straight line from the nasal septum to the sacrum. The neural arches of the vertebrae are deficient, failing to unite posterior to the spinal cord. The vertebral column is shortened, due to failure in separation of the cervical and thoracic vertebrae.



Fig. 1.—Dorsal view—head dissected from back, showing defect of cervical vertebrae.



Fig. 2.—Lateral view—umbilical hernia.

As to the etiologic factors at work in the production of this condition, nothing is known. Hydrocephalus and hydrorachis were the causes given by the older authorities. Following the report of Abbot and Lockhart, the amniotic fluid theory gained prominence. According to the theory of Hayes, there is a developmental arrest during an embryonic state in which there is a dorsal concavity in the vertebral axis,—in itself regarded as an abnormality. Bartelmez advances Child's theory of development as follows. The regions of an embryo which are most active at any given time are the most susceptible to injury. In cases of iniencephalus and spina bifida everything de-

velops normally, except that the brain ventricles and spinal column remain in communication with the amniotic cavity; the degeneration of the central nervous system being due to maceration of the liquor amnii. Skeletal defects are due to the lining of the central nervous system remaining in communication with the outer skin. Neural defects are due to failure of the neural folds to close.

Case Report.—Mrs. M. R., aged forty-three, Polish, para, xi. Husband in good health. Seven deliveries instrumental, three deliveries normal. Eight children living and well. One child died when seven days old, one at seven months.

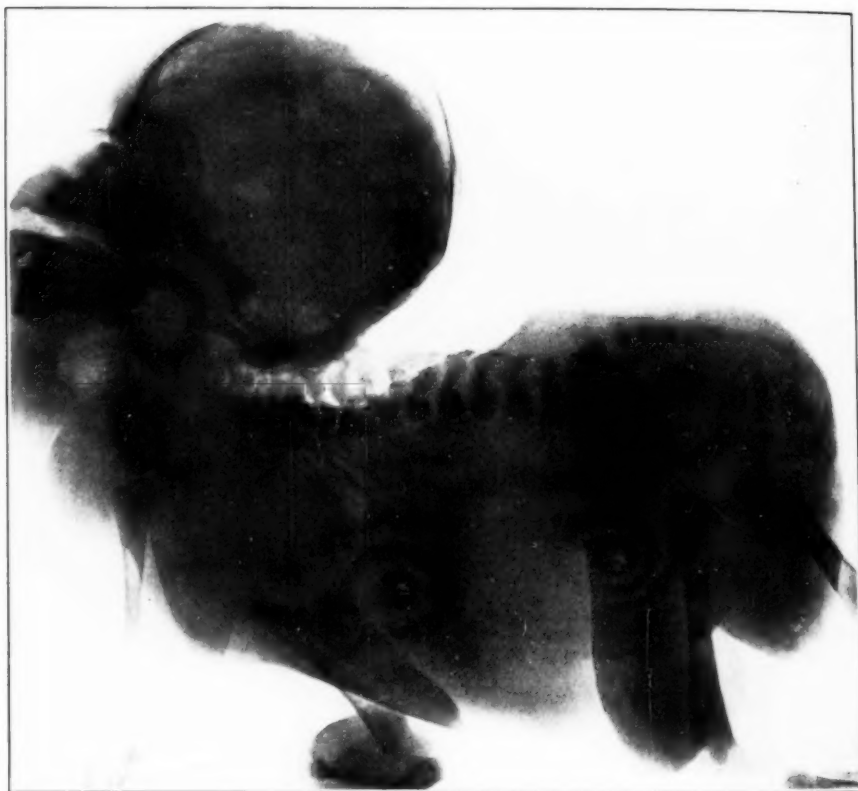


Fig. 3.—X-ray—lateral view.

Called to the home of the patient by Dr. C. S. R., because he was unable to deliver her. Patient was found lying in a pool of blood in bed, almost exsanguinated, with a pulse of 132 and a temperature of 100°. The uterus was the size of a full term pregnancy, no heart sounds being obtained. Both feet and lower legs were dangling out of the introitus. Due to her condition the patient was immediately sent to the hospital. On vaginal examination the vagina was found to be large, cervix effaced, and the legs extending out of the os externum; the fetal sacrum faced anteriorly and attached just above it to the back was a tumor mass the size of a child's head which was thought to be a teratoma. With the fingers of the left hand an attempt was made to dissect this tumor free from the fetal body while

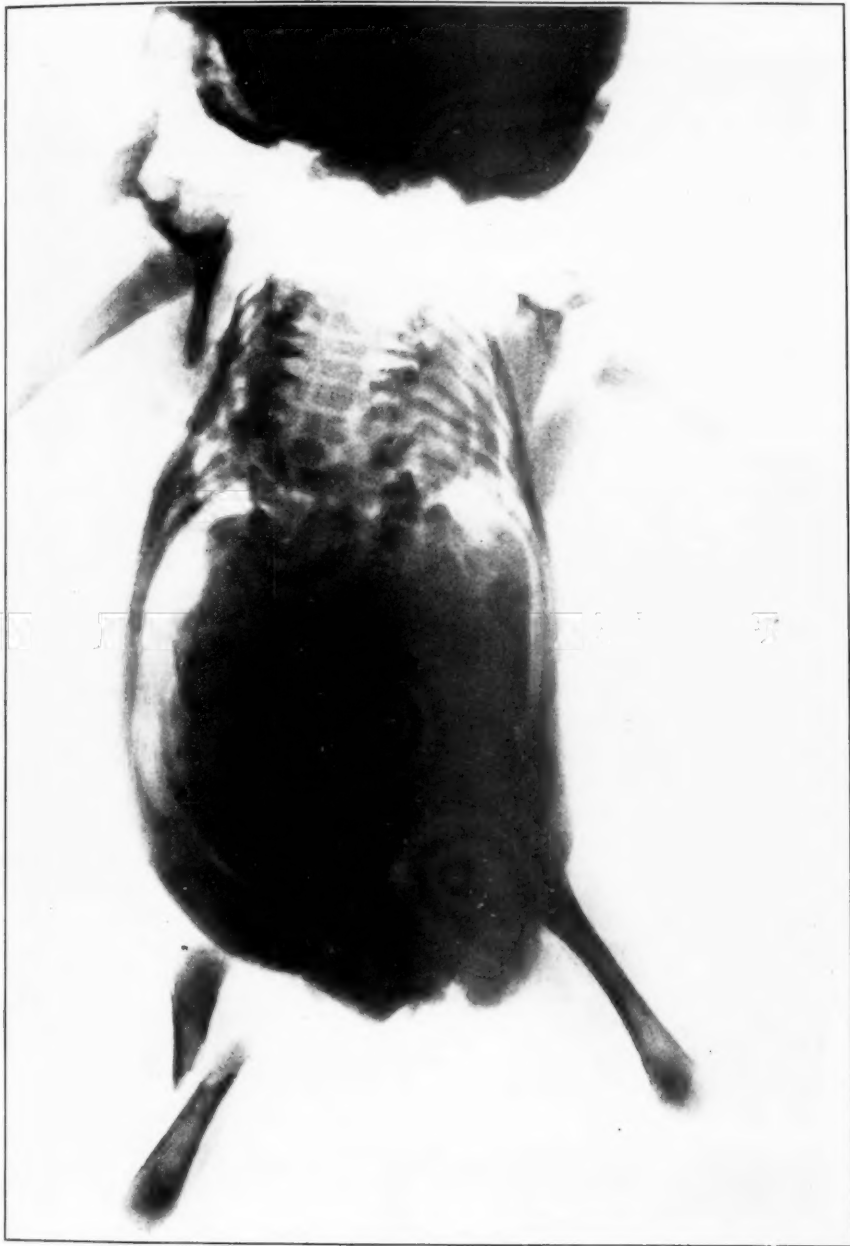


Fig. 4.—X-ray—dorsal view.

traction on the extremities was made with the right hand. Suddenly, something gave way and the extraction occurred very rapidly. It was at first thought that the uterus had been ruptured, but as the back came to view it was seen that the tearing was due to loosening of the skin and fascia which held the head of the child in extreme retroflexion. Delivery of a stillborn fetus was then easily effected.

The mother was given saline by hypodermoclysis before and after delivery. Recovery occurred in eleven days, after slight sepsis. The antepartum hemorrhage was due to partial separation of the placenta during the efforts made at home to do a breech extraction.

Description of Fetus.—Female at term, stillborn. Weight, 7 pounds 5 ounces. Length 49 centimeters. Head markedly retroflexed with the occiput attached to the dorsum (Fig. 2). Face looks upward and slightly oblique and to the left. Features and facial structures normal. The trunk exhibits a marked dorsal concavity. There is no distinct neck, the head tending to merge with the shoulders and back. There is failure in development of the cervical vertebrae with failure of union of the vertebral arches. There is a marked umbilical hernia measuring 6.5x5x3 cm. (Fig. 2). The extremities are normal. (The fracture of the left femur occurred from forcible traction during attempt at delivery at home.) Distance from anus to point of attachment of head to dorsum is 9 cm. Thoracic structures were normal. The fetus had bilateral polycystic kidneys.

OBSTETRICAL IMPORTANCE

A case of this nature represents not only a problem in diagnosis, but also one in management during labor. The question of proper procedure at once comes to mind. With an improper diagnosis, as in this case, the procedure must be guided by the existing conditions. With the same abnormality of fetus and a vertex instead of breech presentation and failure of engagement to take place, various procedures would be thought of, varying from podalic version to cesarean section; if proper diagnosis had not been made. With a small fetus spontaneous delivery is possible; but where the fetus is at term operative procedure is indicated. An early diagnosis must be made in these cases to insure proper procedure; and if not made, interference is guided by the conditions as they arise.

REFERENCES

- (1) *Abbot and Lockhart*: Jour. Obst. Gynec. Brit. Emp., October, 1905, viii, 236.
- (2) *Ballantyne*: Manual of Antenatal Pathology and Hygiene, 1904, i, 332.
- (3) *Bartelmez*: Surg., Gynec., and Obst., August, 1925, xli. (4) *Dorland*: Surg., Gynec., and Obst., August, 1925, xli, 2, 180. (5) *Hayes*: Jour. of Anat., London, January, 1922, lvi, 155. (6) *Lewis*: Am. Jour. Obst., January, 1897, xxxvi, 1, 11.
- (7) *Saint-Hilaire*: Traite de Teratologie, 1837, Brussels. (8) *Schwalbe*: Die Morphologie der Missbildungen, Jena, 1907, 140.

497 EAST GRAND BOULEVARD.

HYDATIDIFORM MOLE COMPLICATED BY PERFORATION OF THE UTERINE WALL AND SECONDARY CHORIO- EPITHELIOMA OF THE PELVIS*

BY P. BROOKE BLAND, M.D., PHILADELPHIA, PA.

(From the Department of Obstetrics, Jefferson Medical College)

THE clinical report embodied in the title of this paper concerns probably the most frequent, as well as the most serious pathologic alteration of the ovular envelope. It has long been recognized that an apparently benign mole may occasionally assume a malignant propensity, erode the endometrium, invade the myometrium and finally, perforate the peritoneal investment of the uterine body. In a certain number of cases an even more serious condition may ultimately result, the tumor assuming a degree of malignancy which challenges all other types of malignant growths. The tumor described in this case report portrays consecutively the three pathologic aspects which this neoplasm sometimes assumes, namely: First, a simple, histologically benign growth, second, a perforating uterine tumor, and third, an exceedingly fatal type of malignant chorioepithelioma.

Historical.—According to Williams, this peculiar alteration in the embryonal sheath was first described by Von Graefenberg in 1565. Aetius von Ameda, according to Kossman, wrote intelligently of hydatidiform mole in the early part of the sixteenth century, though he did not have a clear, if any, conception of the pathologic nature of the condition. Various theories regarding the character of the trouble were propounded by early writers. Some regarded the vesicles as identical with the ordinary echinococcus or hyatid cysts. Others looked upon the cystic bodies as mature ova, while still others believed they represented evidence of multiple pregnancy. Williams refers to the case of the Countess Hagenau, who, it was believed, gave birth to three hundred and sixty-five embryos at a single labor. These were obviously simple hydatidiform cysts. It was not until the beginning of the nineteenth century that the lesion was finally recognized as a cystic degeneration of the placental villi.

Frequency of Hydatidiform Mole.—With regard to the frequency of simple benign hydatidiform mole, there is a wide gap in statistical figures. Accurate statistics respecting its incidence are not forthcoming, but modern writers believe the condition occurs with much greater frequency than taught by their predecessors. The earlier authors fixed the percentage as one in twenty thousand pregnancies, but later investigators report a percentage as high as one in two hundred, while still others assert that the complication arises in seventy-five per cent of all abortions.

Madame Boivin, in 1827, one hundred years ago, and to whom nearly all authors refer, stated the condition arose once in twenty thousand pregnancies.

Kress refers to the work of Freund who likewise set the percentage at one in twenty thousand pregnancies.

*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

Broadhead and Kasseholm, in a study of 12,030 cases of labor and abortion from January, 1914, to November, 1921, found six hydatidiform moles, or one in two thousand.

Findley, in an analysis of five hundred cases of hydatidiform mole, believes the incidence of clinically frank cases is about one in 728 to one in 1000. This writer states the condition is probably more frequent, though accurate statistics, he claims, are not available, because only complicated moles are reported, as a rule.

Gordon, in a study of 4500 abortions in the Bellevue Hospital, New York, found twenty-one cases of hydatidiform mole or one in two hundred and fourteen. In a series of 348 pathologic abortions this writer found hydatidiform degeneration in 43 per cent.

Velasco in 8187 maternity patients found forty typical examples of hydatidiform mole or one in 204 cases (5 per cent).

Storch, quoted by Frank, in an examination of a large series of unselected abortive ova found that 75 per cent showed hydatidiform degeneration.

A perusal of recent literature indicates there is a growing conviction that the condition is more frequent than heretofore believed.

Meyer, in an analysis of 2589 abortions in the Mall collection, found, on gross examination alone, eight cases of mole or one in 261 cases. After a careful microscopic study, he reached the conclusion that the percentage was even greater. In a study of 104 tubal pregnancies, he found hydatidiform mole in 46 per cent (quoted by Payne). Meyer believes from 4 to 10 per cent of all early pregnancies are complicated by some degree of hydatidiform degeneration. He claims the determination of the frequency of this condition depends on the care with which all specimens are examined.

Frequency of Uterine Perforation and Rupture.—While most authors mention uterine perforation with rupture as one of the possible complications of hydatidiform mole, only a few report observation of personal cases. Probably this culmination of the trouble is more frequent than a study of the literature indicates.

From January, 1921, to January, 1925, inclusive, I found the case reports of sixty-eight moles. Of this number there were five cases of perforation with simultaneous bursting of the uterine wall. This would indicate that perforation may occur in one of every twelve cases, though from the relatively large number of cases of simple moles observed, it is obvious that uterine perforation is not a frequent complication. The figures just mentioned regarding this feature of the trouble certainly could not be regarded as sound criteria of the frequency of perforation or rupture. It is equally obvious, however, that spontaneous rupture complicating hydatidiform mole is a real danger; due, first, to the extraordinary and rapid enlargement of the uterus and second, to hydatid infiltration of the myometrium.

The five cases of perforation with rupture recorded from 1921 to 1925 were reported by Krellenstein, who reviewed the literature of all recorded cases of hydatidiform rupture of the uterus from 1904 to 1924. This series included a personal case of Krellenstein.

Hydatidiform Mole and Chorioepithelioma.—A voluminous literature has arisen regarding the etiologic relationship of hydatidiform mole

and chorion epithelioma. This has developed since Sanger, in 1889, first drew attention to this unusual malignant degeneration of the placenta.

Special interest in chorion epithelioma is displayed by numerous writers and up until 1921 there were recorded in the literature 587 cases. In the quarterly accumulative index for 1921 to 1924 inclusive, I found twenty-five additional cases recorded, making to date, a total of 612 cases.

It has long been known that hydatidiform mole in some way is etiologically related to chorioepithelioma, though there has never been demonstrated a type which one might regard as the etiologic forerunner of malignancy. Why a certain number of moles become malignant is unexplainable. In their early cell architecture they probably contain elements which may determine their subsequent character. Unquestionably a large number of moles, though not the majority by any means, become malignant choriomas. Indeed, from the relatively large number of moles encountered the percentage of malignant transformation is not high. It is sufficiently high, however, to remind one of this outstanding danger.

Statistics regarding malignant degeneration of hydatidiform mole, while not in strict harmony, place the percentage figure at a consistently high point. Payne, refers to Pallosson and Violet who report 455 cases of chorioepithelioma, 203, or forty-four per cent of which were preceded by hydatidiform mole. Of the 500 cases of mole collected from the literature by Findley, 157 or 31.4 per cent became malignant choriomas.

Kerr believes, as do a great many writers, that hydatidiform mole precedes chorioepithelioma in 50 per cent of cases. Novak refers to the well-known series of cases reported by Teacher. Of the 188 cases of chorioepithelioma studied by Teacher, seventy-four or 39.3 per cent were preceded by mole.

Senarels reported forty-nine cases of hydatidiform mole and three, or 13 per cent of these developed chorioepithelioma subsequently.

Novak claims, however, that only a very small percentage of moles, (not more than 1 per cent) become malignant. In support of this view he says: "The frequency of moles is not appreciated and besides malignant choriomas are comparatively rare."

As regards the degree of malignancy of chorioepithelioma following hydatidiform mole, it has been demonstrated that choriomas arising after simple abortion or full-term pregnancy are more viciously malignant than those following mole formation.

In Teacher's series of 188 cases of chorioepithelioma, with respect to the degree of malignancy in those following mole and uncomplicated pregnancy, the mortality figures were given as follows:

Following mole	53.5 per cent
Following abortion	66.7 " "
Following full-term labor	89.6 " "
Following ectopic pregnancy	85.7 " "

In the combined statistics of Lockhart and Teacher (quoted by Findley), the mortality was as follows:

Following hydatidiform mole	52.9 per cent
Following abortion	64.3 " "
Following full-term normal pregnancy	66.6 " "

With regard to the microscopic determination of the potentially malignant mole, there is no type of cell to forecast its ultimate character. Caturani, who has carefully studied this phase of the question, points to certain features which might guide one in determining either the benignancy or malignancy of hydatidiform cysts. Specimens in which the features of the primitive chorion are reproduced in a hydatidiform mole, he always regards with suspicion. The evidence of a malignant tendency of a mole may, to a certain degree, be determined also by a close investigation of the relation of the mole to the maternal structures. Moles which show a distinct tendency to invade the endometrium or myometrium he regards as transitional forms.

Mortality of Hydatidiform Mole.—The mortality rate of hydatidiform mole will depend somewhat, first, on the stage of pregnancy in which the disease begins, second, on the invasive nature of the tumor, and third, on its benignant or malignant character.

In Findley's series of 500 cases there were 265 designated as benign and of this number 237 patients recovered and twenty-eight died, a mortality of 10.5 per cent. Ninety-nine moles subsequently became malignant and forty-five of these patients recovered and fifty-four died, a mortality of 54.5 per cent. In the sixty-eight cases recorded during the past four years the ultimate result was mentioned in sixty-four. Fifty-eight of the patients recovered and six died, a mortality of 9.4 per cent.

The cause of death was attributed to hemorrhage in four, two of which were associated with rupture of the uterus. One patient died of secondary peritonitis and one of secondary chorionic malignancy. With respect to the mortality as indicated in the literature it is set as low as 9 per cent by Gordon and as high as twenty-six by Williamson.

Probably a mortality of ten per cent could be looked upon as a fair minimum and fifteen per cent as a fair maximum, provided the patients are properly treated and exclusive of secondary malignancy.

Time of Occurrence.—Cystic degeneration of the chorion, while it may occur in the latter months of pregnancy, most frequently arises during the embryonal or early fetal period of the ovum. In general, it may be said to occur most commonly during the first or early part of the second trimester of gestation. Sometimes it arises as late as the third trimester.

In the series of sixty-eight cases in which this feature was mentioned, one case was reported as occurring as late as the twelfth month and Findley refers to a case arising in the seventeenth month of pregnancy, though no special data are charted concerning this unusual case. The following table portrays the time of occurrence in thirty-four cases in which this phase of the condition was noted:

1 to 2 months	2 cases or 5.8 per cent
3 to 4 months	19 cases or 55.8 " "
5 to 6 months	9 cases or 26.6 " "
7 to 8 months	3 cases or 8.8 " "
12th month	1 case or 2.9 " "

In Velasco's series the time of occurrence was recorded as follows:

1 to 2 months	2 cases or 5 per cent
3 to 4 months	16 cases or 40 " "
5 to 6 months	9 cases or 22.5 " "
7 to 8 months	3 cases or 7.5 " "

From these figures, it is safe to assert that at least 75 per cent of cases occur between the third and fourth month of pregnancy.

Age.—Hydatid degeneration of the chorion is essentially a disease of the most active childbearing period.

Of the sixty-eight cases reported from 1921 to 1925, the age of the patient was mentioned in sixty-three, as follows: Below 20, 12 cases; 20 to 30, 30 cases; 30 to 40, 18 cases; 40 and beyond, 3 cases.

In Velasco's series the age was: Below 20, 10 cases; 20 to 30, 19 cases; 30 to 40, 10 cases; 40 and beyond, 2 cases.

In Findley's 500 cases, the age was recorded in 394 as follows: 13 years, 2 cases; 14 years, 1 case; 15 to 25 years, 111 cases; 25 to 35 years, 143 cases; 35 to 45 years, 84 cases; 45 to 50 years, 36 cases; 50 to 55 years, 17 cases.

In the figures quoted above it is shown, as one would naturally assume, that the disease corresponds to the most active reproductive period of life, namely, from the twentieth to the thirty-fifth year. Of a total of 498 cases in which the age of the patient was mentioned, 348 or 69.8 per cent occurred between the years of twenty and thirty-five and 150 or 30.2 per cent before the twentieth or after the thirty-fifth year.

Size of Uterus.—It is generally taught that hydatidiform mole is in most instances accompanied by an excessive enlargement of the uterus, which is out of proportion to the stage of pregnancy, or which does not correspond to the period of amenorrhea. It is probably safe to say that the uterus, in the majority of cases, is about twice as large as the period of amenorrhea would indicate. In seventeen cases in which the size of the uterus was noted, it was reported as larger than the normally pregnant organ in nine cases, smaller than normal in five cases and normal for the period of amenorrhea in three cases.

Previous Pregnancies.—It is held that the neoplasm is most commonly found in patients who have borne children previously. In this connection it may be well to point out the conviction that the birth of an uncomplicated mole does not cause sterility and that recurrence of the trouble in subsequent pregnancy, while not the rule, is not improbable. Recurrence has been observed from two to eighteen times and in my series of sixty-eight cases, one patient gave birth to moles on eleven occasions. Recurrence, however, is rare. In Findley's 500 cases, recurrence was observed in seven, or 1.4 per cent only. It is interesting to note that normal pregnancy followed in twenty-five cases or 5 per cent.

As regards the relation of mole to previous pregnancies, this phase of the matter was recorded in fifty-six of the sixty-eight collected cases. The disease arose thirty-eight times, or 67 per cent in multiparae and eighteen times, or 33 per cent in primiparae.

In Velasco's forty cases, 70.2 per cent were multiparae and 27.8 were primiparae.

The character of the preceding pregnancy does not seem to bear any relationship etiologically, as it does to chorion epithelioma. In fifty-six cases in which reference to previous pregnancies was recorded, there were seven abortions, one stillbirth, one difficult forceps delivery and one case of long standing postpartum spinal paralysis. In forty-seven patients, the previous obstetric history was normal.

Lutein Cysts and Hydatidiform Mole.—Twenty-five years ago (1901), Stöckel directed attention to the possible etiologic relationship of lutein cysts to hydatidiform mole, and especially to chorion epithelioma. Many theories respecting the influential rôle lutein cysts are thought to play in chorionic tumors have been set forth, but no positive proof as to their causative influence has been adduced. They may have some bearing on a neoplastic tendency of the chorion and they may not. In most instances, or in approximately 90 per cent of cases, the ovaries are not cystic, or grossly deranged in any way.

In Findley's 500 cases of mole, cystic ovaries were found in only fifty-eight or in 11.6 per cent.

In the sixty-eight moles recorded from 1921 to 1925, reference was made to the association of bilateral ovarian enlargement in only one case.

Keller refers to instances in which lutein cysts do not precede but follow mole and, therefore, may be secondary. It has also been demonstrated that ovarian cysts frequently undergo regression after expulsion of the mole. In this connection it is well to mention that bilateral ovarian cysts are more commonly associated with chorioepithelioma than mole.

Coventry quotes Paletini, who in 1905 collected sixty-eight malignant choriomas and of this number sixty-two or 91 per cent were associated with bilateral lutein cysts. Coventry also reports two personal cases of hydatidiform mole, one of which was associated with lutein cysts.

With our present knowledge regarding the association of lutein cysts, cysts at times assuming an attitude of aggression, at other times one of regression, it is impossible to determine if their presence is incident to the pregnancy or coincident with the pathologic alteration in the chorion. That they may be etiologically related is possible, but thus far no legitimate proof that they are actually causative has been presented. To stand the test of etiologic relationship they should be at least a fairly constant and not an occasional accompaniment of hydatidiform mole.

Presence of a Fetus.—Most writers are in accord with the teaching that in most instances a mole is expelled without any evidence of a

fetus accompanying the expulsion. It is obvious that, with extensive degeneration or destruction of the mechanism concerned in fetal nutrition, early fetal death must be inevitable. With only partial destruction of the chorionic membrane, the fetus may for a time survive and be expelled with the cystic mass.

In the series of sixty-eight cases recently collected from the literature, the fate of the fetus was mentioned in fifty-five. It was absent in forty-nine cases, or in 81.1 per cent and present in six or 10.9 per cent.

In fifty cases studied by Velasco the fetus was absent in forty-seven or 92.5 per cent and present in three or 7.5 per cent. In the combined 105 cases, the fetus was absent in 96 cases or in 91.5 per cent and present in nine cases or in 8.5 per cent.

The fetus was found in my personal case, as indicated in the case history. In this patient the expulsion of the fetus preceded the expulsion of the mole by several hours.

It is well to keep in mind that the primary expulsion of a fetus, placental tissue and membrane followed some hours later by the expulsion of the mole might indicate a possible twin pregnancy. This, according to Frank, has been observed repeatedly.

Of course, it is quite possible for a mole and fetus to be expelled simultaneously, though it would seem physically impossible for a well-developed fetus and an advanced mole to exist except in plural pregnancy in the uterus at the same time. In moderate or extensive cystic degeneration of the chorion destruction of the fetus is inevitable. A well-developed fetus with placenta and membranes, as found in my patient associated with a well-developed placental neoplasm, would be suggestive at least of a plural gestation.

Case Report.—Mrs. C. M. D., age thirty, was first seen on December 1, 1924. She had never suffered from any serious disease. Menstrual history normal. The last normal period occurred on August 28, 1924. The patient was married seventeen months prior to coming under observation. She had not been pregnant. She stated she had not been well since her last "period" in August.

Four weeks prior to admission she experienced considerable pain in the lower part of the abdomen and this was followed by a bloody discharge, which continued daily to the period of coming under observation. Usually the discharge was thin and watery, but occasionally it was thick and contained clots of varying size. During the period of amenorrhea she had some nausea and vomiting generally in the morning, but occasionally also in the evening. Ten days before admission the patient experienced considerable difficulty in breathing. This became progressively worse and her breathing, on admission to the hospital, was only possible while in a sitting posture. For several days, the patient had noticed moderate swelling of the ankles. This was always worse in the evening. She also complained of swelling of the eyelids, which was worse at night. She had some frontal and temporal headache and this had been present during the preceding two months. She experienced also considerable dryness in the mouth and throat, more pronounced at night. During the two days prior to admission, she coughed and at times expectorated

a blood-tinged mucus, coincident with the embarrassed respiration. Micturition had been frequent both by day and by night, but especially during the night.

Physical Examination.—The most prominent symptom was the marked dyspnea. It was impossible for the patient to breathe except in the sitting posture. The veins in the neck were noticeably engorged, but there was no cyanosis or jaundice.



Fig. 1.—Portion of mole expelled December 3, 1924. Part of clotted blood also visible in specimen.

Pretibial edema was present and there was slight swelling of the eyelids. The tongue was fairly clean, though dry. The eye-grounds were much paler than normal and the veins seemed "overfull." There was no retinal hemorrhage. The breasts showed the usual changes of early pregnancy. There was no evidence of complicating disease in the lungs.

The apex beat was slightly displaced to the left. There was a presystolic murmur and a thrill at the apex, but there were no signs of incompetency. X-ray exam-

ination of the chest showed some unusual peribronchial thickening, but no evidence of neoplastic disease.

The abdominal muscles were more or less hypertonic and there was distinct tenderness in the region of the liver. The uterine body was found enlarged and extended to the umbilicus. The enlargement was uniform, and intermittent contractions were observed. The size of the organ corresponded to a six months pregnancy and exceeded, therefore, the period of amenorrhea by at least two months. A diagnosis of pregnancy with toxemia and threatened abortion was made. This was confirmed on vaginal examination.

Temperature, 98.2; pulse, 118; respirations, 28; and blood pressure, 150 and 90.

The blood counts were as follows: December 1, erythrocytes, 1,550,000; leucocytes, 14,800; color index, 1+; hemoglobin, 35 per cent.



Fig. 2.—Section of mole expelled December 3, 1924.

On December 8, following blood transfusion of 500 c.c., there were erythrocytes, 2,640,000; leucocytes, 10,800; hemoglobin, 45 per cent; and color index, 0.87.

Twenty-four hours after the patient was admitted, the bleeding became more marked and associated with a serous discharge.

Uterine contractions began coincidentally and thirty-six hours after admission the patient expelled a fetus, some placental tissue, particles of membrane and large blood clots. After the expulsion of these materials, the bleeding abated considerably, but the uterus remained large. At midnight of the second day following admission, the patient expelled a large mass of organized blood clot. This contained cystic masses, (frog's eggs), of varying size, and was followed by profuse bleeding. The patient was given 500 c.c. of blood by direct transfusion. A mild chill followed the procedure. Prior to this, the patient appeared gravely ill.

After the administration of the blood, her condition seemed to improve in every way. She ran a progressively improving convalescence and was discharged from the hospital thirteen days after admission.

On the date of discharge there was a slight bloody vaginal discharge, but examination showed the uterus well contracted and seemingly normal. The expulsion of the cystic mass, hydatidiform mole, was not followed by surgical therapy, since, in view of the pathologic report, active interference did not seem indicated.

The pathologic report of the material expelled, as submitted by Dr. Bowman C. Crowell, follows:

The specimen consists of a thin red membrane about the size of the palm of the hand, adherent to which is a mass of villous shreds. The shreds are almost white and transparent. At the extremities and along the course of some of these villous processes are small bullous swellings. The whole mass has a volume of about 300 c.c. (Figs. 1 and 2.)

Microscopic sections show degenerated chorionic villi covered by syncytial cells. These in places have multiplied to form buds on the villi, and some of these cells are detached to form small sheets of cells. Isolated cells of this nature may be



Fig. 3.—Uterus opened to show primary tumor.

seen in the mass of blood clot. There is no visible proliferation of the Langhans' cells. Diagnosis: Chorioadenoma.

The malignancy of this specimen is doubtful, but I am inclined to regard it as a benign process.

After the patient returned to her home she developed a severe tonsil infection and was quite ill. The uterine bleeding did not subside, but it gradually became worse. Every "three or four days" it was accompanied by the discharge of clots of varying size and this always occasioned a great deal of pain.

On January 16, 1925, forty-six days after the expulsion of the hydatidiform mole, she had a severe chill and her temperature rose to 103° F. She was readmitted to the hospital on January 18. On admission, her morning temperature was 99° and it registered 101.4° in the evening. It then pursued a mild fluctuating type. The pulse rate was 110 and the respiratory 26. The blood pressure 118/64.

The blood examination showed: erythrocytes, 3,600,000; leucocytes, 5,100, hemoglobin, 60 per cent; and color index, 0.83.

The urine, with a specific gravity of 1020, except for a faint trace of albumin, was negative.

The abdominal wall was flat, though there was slight tenderness over the lower portion. No masses were palpable. Vaginal examination revealed the uterus in good position, freely movable and not appreciably enlarged. It could be moved about without causing undue discomfort and without exciting bleeding. No irregularity in the contour of the organ could be discerned. There were no palpable signs of adnexal disease.

The patient was kept under observation in the hospital for a period of nine days. During this time, the hemorrhage continued. Some clots of moderate size were expelled. No "cystic masses" were seen. Owing to the continued bleeding, it was assumed that particles of membrane or placenta or both had been retained, though the possibility of a proliferating hydatidiform mole, or its sequela, a chorio-epithelioma, was constantly in mind.

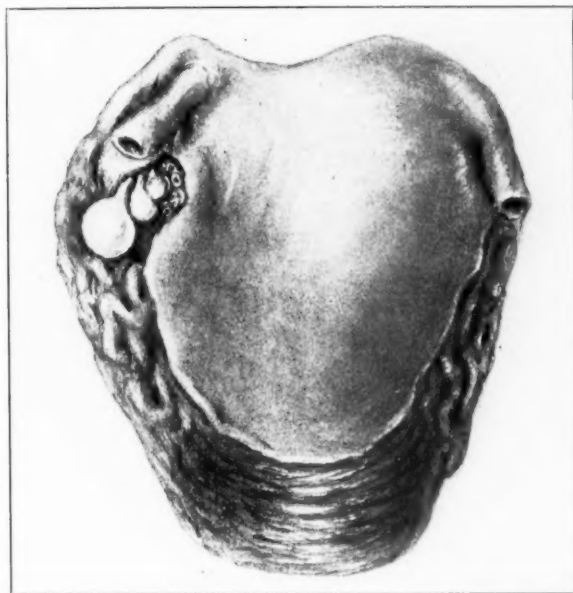


Fig. 4.—Serous surface of uterus showing cysts projecting from penetrated wall.

Accordingly on Jan. 27, fifty-eight days after the patient first came under observation, an exploratory curettage was performed. The tissue removed by this procedure was, largely from its gross appearance, regarded as organized blood. Close inspection of the material disclosed some "hydatid" cysts, but these were not numerous. From the fragmentary character of the blood combined with the presence of hydatid cysts, it was thought prudent to perform an exploratory hysterotomy. Accordingly, an abdominal incision was made. The uterus was not grossly enlarged nor was there visible alteration in its contour. On exposing the interior of the organ there was found a necrotic area, 3 cm. in diameter in the left posterolateral wall. The surface of this area had obviously been disturbed by the preceding curettage. A tentative diagnosis of chorioepithelioma following hydatidiform mole was made. The hysterotomy incision was closed immediately. Realizing the etiologic relation corpus lutein cysts are thought to bear to hydatidiform

mole and chorioepithelioma, the ovaries were carefully inspected and found to be normal in every particular. It was regarded as impossible, therefore, for these organs to have any bearing on the uterine condition. The uterus was immediately removed, but the ovaries and tubes were allowed to remain. (Fig. 3.)

Immediately after the operation, the patient was given 700 c.c. of blood by direct transfusion. The recovery of the patient following operation was uneventful and on February 17, she left the hospital in good condition.

The pathologic examination of the specimen was made by Dr. Bowman C. Crowell and his report is herewith presented:

The specimen measures 4.5 cm. from above downwards, 5 cm. transversely and 3.5 cm. anteroposteriorly. The wall of the uterus is 2 cm. in thickness approximately. On opening the uterus there is seen an ulcerated area in the region of the left cornu, projecting from which is a rather tough, yellowish, gray material in which may be seen a few transparent, thin-walled cysts two or three mm. in diameter (Fig. 3). The endometrium about this, as well as about the right cornu, appears thickened and yellowish. In the myometrium near the periphery

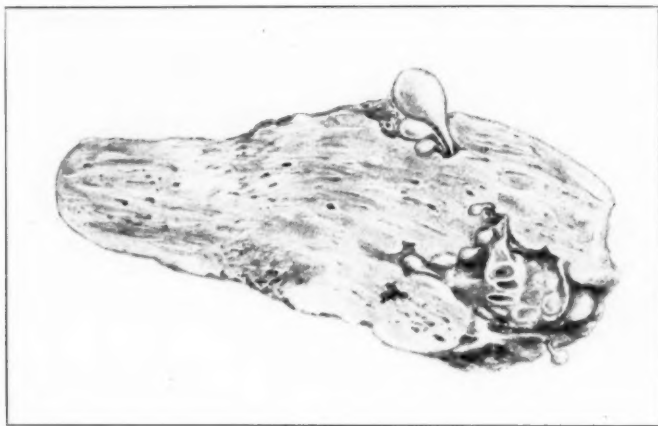


Fig. 5.—Showing section through tumor with penetration of uterine wall.

are seen small vessels in or about which is an opaque yellowish material, small in amount. On the outside of the uterus, below the attachment of the left fallopian tube, project two small, grape-like cysts, similar to those seen in the ulcerated area of the endometrium. (Figs. 4 and 5.) These cysts are in all respects similar to those seen in the specimen expelled from the uterus which was received in the laboratory Dec. 3, 1924. In addition, there is thickening of the endometrium and infiltration of the myometrium. A section was removed for histologic examination from the right side of the uterus so as to include the entire thickness of the myometrium. Further cutting of the gross specimen was avoided in order to preserve it for drawing. (Fig. 6.)

Microscopically, this particular section shows no remnant of the endometrium. The myometrium is edematous and there is also a mononuclear and lymphocytic infiltration of the myometrium which is rather extensive in some parts. Small areas of necrosis of the myometrium are also present. In addition there are seen diffusely scattered throughout the myometrium large mononucleated cells with abundant clear protoplasm. Some of these cells have two small nuclei, others have very numerous nuclei and still others large chromatin masses. (Fig. 7.) In some places it appears as though some of these nucleated masses were within muscle

fibers. It is obvious that these cells are of the same nature as those described clothing the villi in the original chorioadenoma previously reported from this case. In about the central zone of this section, or somewhat nearer the periphery than the endometrium, there is a vein in the lumen of which are numerous large cells forming a syncytial mass. (Fig. 8.) These are similar to those cells which have been described in the myometrium, and these cells are found in several successive sections removed from this block of tissue.

Diagnosis.—Malignant chorioadenoma.

An incision through the uterus was made later in such a way as to pass through the larger mass presenting on the endometrial surface and extending to the outer surface of the uterus at a line just posterior to the left fallopian tube where the tumor is seen to be extending through the entire thickness of the myometrium.

Histologic examination of the section thus removed shows the remains of the chorionic villi with proliferating syncytial cells in the inner part of the diffuse infiltration with multinucleated cells, as above described in the outer part.

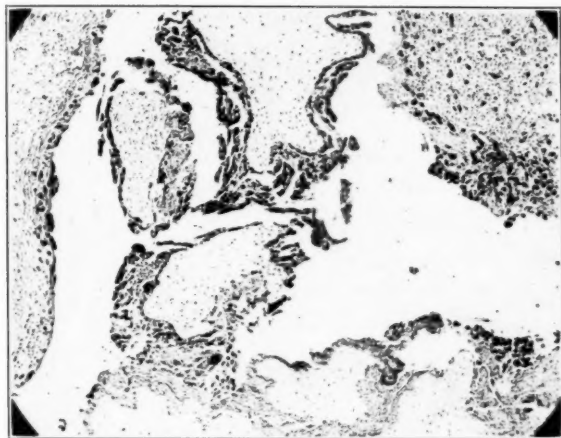


Fig. 6.—Section from uterus after extirpation showing mole penetrating endometrium.

After leaving the hospital, the patient improved very rapidly and seemed to be quite well. On October 1, 1925, she again came under observation complaining of vague pain in the left side of the pelvis, and on October 19, vaginal examination revealed a small cystic mass in the left pelvic cavity. Blood examination at this time showed: Erythrocytes, 4,230,000; leucocytes, 4,200; hemoglobin, 83 per cent.

The patient was kept under observation until Oct. 26, or for a period of eight days. In order to determine the true nature of the left pelvic mass, an exploratory posterior vaginal incision was advised.

The patient was anesthetized and an exploratory posterior vaginal incision was made. Through the vaginal opening a semifluctuating globular mass, comparable in size to a small orange, was outlined. The mass was not firmly adherent, but it was not freely movable.

In location, consistence and contour, it resembled a simple ovarian cyst. The pelvis in general was free from adhesions. The probability of recurrent chorion epithelioma was considered. Gentle efforts to free and deliver the mass through the vaginal opening failed. In order to determine the nature of the tumor, a blunt-pointed scissors was carried into the mass and the blades were separated.

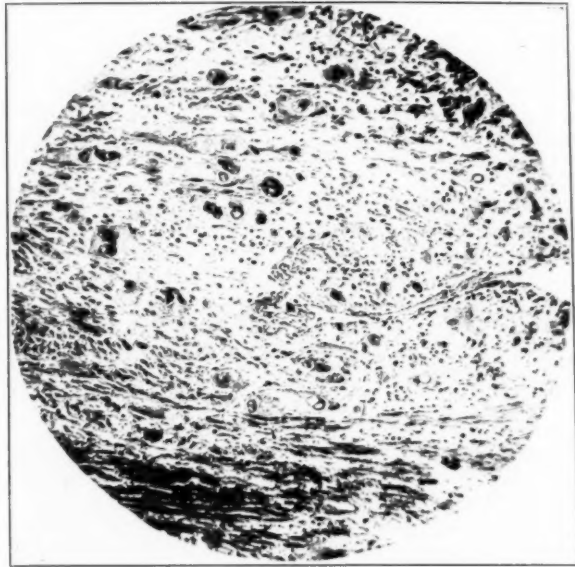


Fig. 7.—Section from uterus near cornu, showing malignant changes.

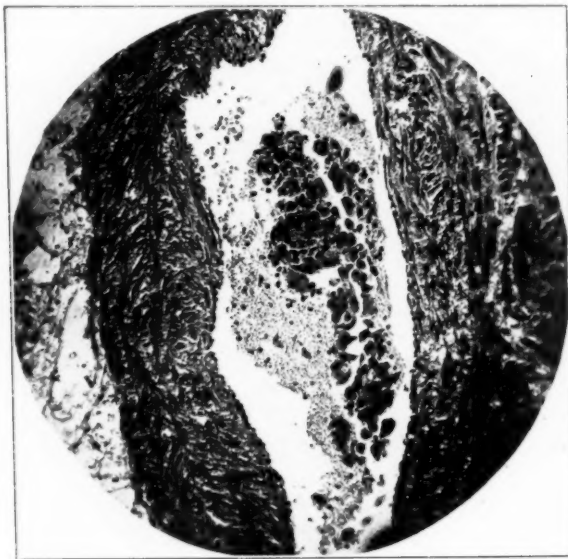


Fig. 8.—Section of vein in midst of myometrium. Shows cells lying free in lumen, derived from malignant mole.

This on afterthought was obviously an exceedingly imprudent procedure. It was followed immediately by a mammoth and most alarming hemorrhage. Efforts to control the bleeding from below failed utterly and accordingly an abdominal incision was made. The bleeding surface was isolated and the hemorrhage itself was finally controlled by the introduction of a series of "mass" suture ligatures. The

patient, despite every possible means of restoration, succumbed to the tremendous blood loss one hour subsequently.

Some of the tissue, grossly resembling organized blood clot, removed through the vaginal incision was collected and proved, on microscopic examination, to be recurrent chorioepithelioma. The final laboratory report is herewith presented:

All semblance of villi has been lost, and the small fragments of tumor examined consist of solid masses of large cells closely packed together. These cells are remarkably uniform, large, polyhedral, with protoplasm that scarcely takes the stain, and fairly large, round, deeply-staining nuclei. Mitotic figures are numerous. Between these solid groups of cells are a few strands of more elongated, but equally active cells. All of these cells are apparently of syncytial origin, and closely reproduced the changes found in the uterine tumor itself. (Fig. 9.)

Diagnosis.—Chorioepithelioma.

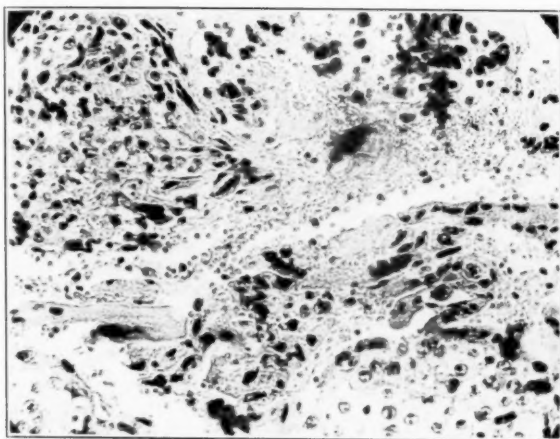


Fig. 9.—Section from pelvic mass, (incised October 26) showing same character of growth as in uterus shown in Fig. 4.

COMMENT

A study of this case record portrays clearly the transition of a lesion which was regarded both clinically and pathologically as a benign hydatidiform mole; to a perforating or malignant mole and finally to a highly malignant chorioepithelioma.

It would seem a logical deduction to regard all hydatidiform moles, associated with persistent or recurrent bleeding, bleeding arising after the expulsion of the parent tumor, as potentially malignant, as the forerunner of chorioepithelioma. The bitter lesson taught by the unfortunate outcome of this case emphasizes the futility and grave danger of attempting to determine the true nature of the growth by exploratory methods.

In any case of suspected chorioepithelioma radical measures, if any measure at all is considered, alone should be adopted.

The hemorrhage encountered in this patient was the most frightful I have ever seen and only comparable to that in fatal placenta previa.

Since the operation with its tragic sequela was witnessed by a large number of Fellows of the American College of Surgeons, I feel that a full report of the case with the ultimate result and pathologic diagnosis should be recorded.

REFERENCES

- Boivin, Madame*: The Origin and Treatment of Vesicular Mole, Paris, 1827.
Caturani, M.: Am. Jour. Obst., April, 1917, No. 4, p. 591. *Corcentry, W. A.*: AM. JOUR. OBSTET. AND GYNEC., December, 1920, i, No. 3, p. 266. *Findley, Palmer*: Am. Jour. Obstet., June, 1917, xxv, No. 6, p. 968. *Frank, R. T.*: Gynecological and Obstetrical Monographs, 1921, D. Appleton & Co., p. 467. *Gordon, C. A., Jr.*: Surg. Gynec. and Obst., February, 1923, xxvi, 242. *Keller, R.*: AM. JOUR. OBSTET. AND GYNEC., (Abstract), January, 1924, vii, 122. *Kerr, J. M.*: Lancet, London, Jan. 7, 1922, i, 9. *Krellenstein, J. B.*: AM. JOUR. OF OBSTET., November, 1924, viii, 636. *Kress, C. C.*: U. S. Naval Bulletin, April, 1924, xxx, 460. *Meyer, A. W.*: Am. Jour. Obstet., November, 1918, lxxviii, No. 5, 641. *Novak, E.*: Jour. Am. Med. Assn., June 16, 1922, lxxviii, 1771. *Pallosson and Violet*: Ann. de Gynec. et Obst., 1913, v, 2571. *Payne, E. L.*: Am. Jour. of Surg., August, 1921, lxxiv, 219. *Sanger, P.*: Zentralbl. f. Gynäk., 1889, xiii, 132. *Senarclens*: Theses Lausanne, 1902. *Teacher, J. H.*: Trans. London Obstet. Soc., June 3, 1903, xiv, 256. *Velasco, F. J.*: Jour. Philippine Island Medical Assn., July and August, 1921, i, 153. *Williams, J. W.*: Text Book of Obstetrics, 1924, p. 456.

1621 SPRUCE STREET.

(For discussion, see page 265.)

THE SIGNIFICANCE OF THYROID ENLARGEMENT DURING PREGNANCY*

By J. WILLIAM HINTON, M.D., NEW YORK CITY

(Assistant Professor of Surgery at New York Post-Graduate Medical School and Hospital; Adjunct Assistant Visiting Surgeon Bellevue Hospital)

A CERTAIN percentage of thyroid diseases can be eliminated if the condition is recognized early. During pregnancy the thyroid gland enlarges in a definite percentage of patients. It varies in different localities, and it is estimated that anywhere from 25 per cent to 80 per cent of pregnant women have a thyroid dysfunction. It falls to the part of the obstetrician to recognize and treat this condition during pregnancy. A definite understanding of the classification of thyroid diseases is essential before intelligent advice or treatment can be rendered. The following classification is the one used in this clinic which follows along the lines of Plummer's work at the Mayo Clinic. *First*. Goiters with approximately normal secretory activity or hypothyroidism. A. Adolescent goiter,—physiologic gland with secretory activity diminished. B. Adenomatous goiter,—pathologic gland with secretory activity diminished or normal. C. Colloid goiter,—pathologic gland with secretory activity diminished. *Second*.

*From the Goiter Clinic of Dr. Charles Gordon Heyd's Service at the New York Post-Graduate Hospital and Medical School.

Goiters with increased secretory activity. A. Adolescent goiter,—physiologic gland with slightly increased secretory activity. B. Adenomatous goiter,—pathologic gland with overfunction. C. Graves' disease or exophthalmic goiter,—pathologic gland with overfunction and dysfunction.

Adolescent Goiter.—Adolescent goiter does not concern us at this time, either that with normal secretion or that with hyperthyroidism, as this condition is always seen at the period of adolescence, between the ages of eight and fifteen years.

Colloid Goiter.—This is the enlargement that is most commonly encountered during pregnancy. The thyroid gland is not capable of meeting the excessive demand made on it at the time of pregnancy, and in its final effort colloid is secreted into the acini. This is not absorbed

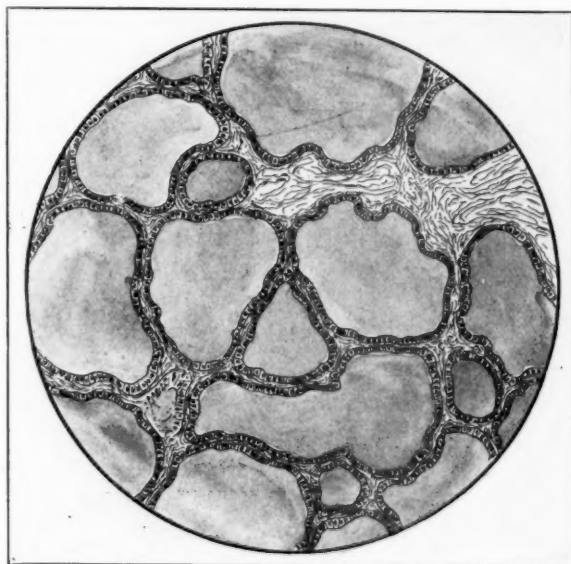


Fig. 1.—Section of adolescent goiter showing the acini dilated and filled with colloid without changes of the epithelial cells.

and the acini soon become distended, at which time the patient presents a uniform, soft enlargement affecting the entire gland, and no nodules can be detected. There is no evidence of a thrill or bruit over the thyroid. The pulse is normal and the patient is usually of a phlegmatic type, with no evidence of increased secretory activity. This condition never takes on hyperthyroidism.

Treatment.—The condition can be cured medically and the sooner the treatment is begun the better the prognosis. Thyroid extract, gr. $\frac{1}{2}$, three times daily for three weeks out of each month should be tried. If this is inadequate the dosage can be increased to as high as

6 to 9 grains daily. These patients should not be put on continuous medication, as a hyperthyroidism may be produced from the medicine. Thyroid extract seems preferable to iodine, although the principle of the two is the same.

Adenomatous Goiter.—Adenomas of the thyroid encountered during pregnancy are usually seen after the second, third, or fourth gestation and they are more commonly seen when the pregnancies have followed in rapid succession. In this type one finds a definite nodule or mass which is confined to one lobe or occasionally to the isthmus of the gland, and which gives the neck an asymmetrical appearance. On palpating the neck, which is best done by standing behind the

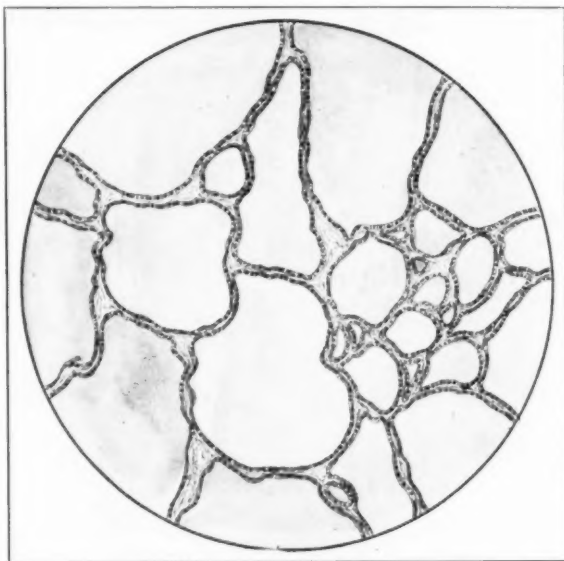


Fig. 2.—Section from a colloid goiter showing the acinal epithelial cells flattened and inactive.

patient and placing the hand over the thyroid region, one finds the mass much firmer than the surrounding thyroid tissue, and usually the remaining portion of the gland is entirely normal. Diffuse adenomas are occasionally encountered involving the entire gland. It is important to make a definite diagnosis between adenomatous and colloid goiter. The former is not amenable to medication. It is unwise to treat patients suffering from adenomatous goiter with iodine or thyroid extract, as the condition cannot be cured, although the swelling of the neck may be diminished, due to the absorption of the colloid in the adenomatous mass. In this condition one is dealing with an encapsulated tumor, and it is as unreasonable to expect to cure the condition with medicine as it is to cure an adenoma of the breast or

uterus by internal medication. The danger of the treatment is that a hyperthyroidism may be produced sooner than would ordinarily occur. With a normal basal metabolism it is unwise to administer medicine in any form. If the patient has already developed a hyperthyroidism from the existing adenoma, ovarian substance, gr. 3, and pancreatic substance, gr. 2, can be administered three times daily. The ovaries and the pancreas have an inhibitory effect over the thyroid activity, and it is advisable to check the hyperthyroidism until the pregnancy is terminated and the case can be submitted to operation.

Exophthalmic Goiter or Graves' Disease.—This condition is occasionally encountered during pregnancy, but it is relatively rare as

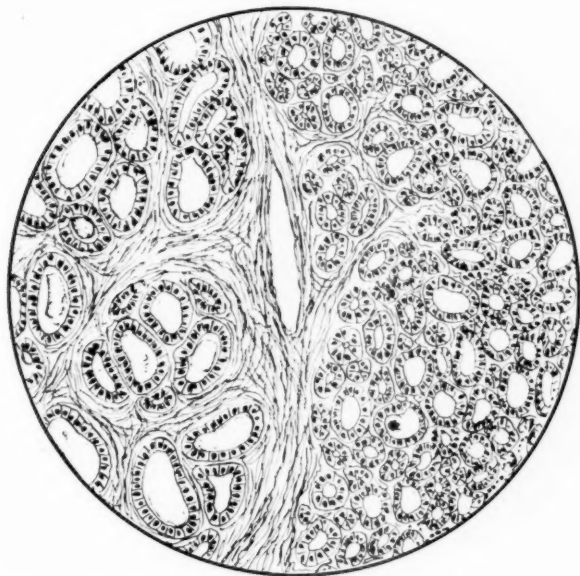


Fig. 3.—A section of the fetal adenoma to the left with capsule separating the normal thyroid tissue to the right.

compared with the other thyroid disturbances. Advice and treatment of the patient depend on several factors. First, the severity of the disease and secondly, the duration of pregnancy. If the disease is rather severe and the patient is in the early months of pregnancy, it is usually best to abort the patient. If the patient is in the fifth or sixth month and the disease is relatively mild, it is usually safe to carry the patient to term without undue harm. If the patient is past the fifth month and critically ill, it is probably best to ligate the superior thyroid arteries and carry her along with medical care. It may be necessary in some cases to perform a thyroidectomy, but this will depend on the clinical picture. Lugol's solution is not to be used as a curative measure.

Indications for the Use of Iodine and Thyroid Extract During Pregnancy.—Iodine or thyroid extract should always be used in colloid hypertrophy of the thyroid. As this is the type most frequently encountered during pregnancy, the prognosis in thyroid disturbance is favorable. Adenomatous goiter seems to have its origin during intra-uterine life from embryologic tissue which forms the fetal adenomas or Wolfler's rests. These are formed, presumably, due to the lack of iodine in the mother at this time. These fetal adenomas do not serve a useful function to the system, but during the three periods of life in which excessive work is thrown upon the thyroid; namely, during adolescence, the childbearing period, and the menopause, these cells in

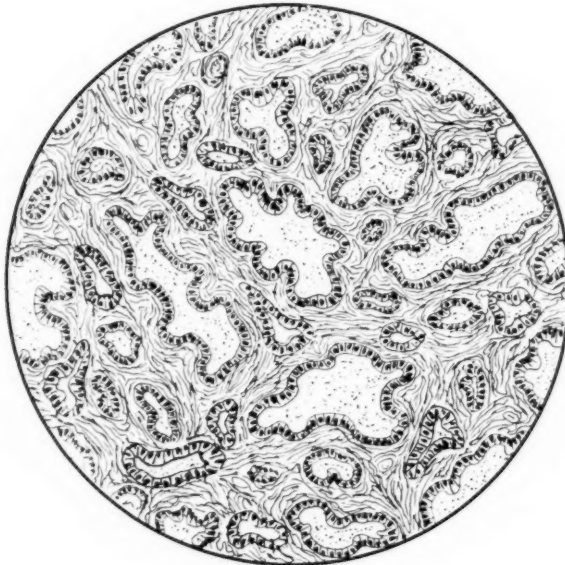


Fig. 4.—Section from exophthalmic goiter or Graves disease with hypertrophy and hyperplasia of the acini.

trying to meet the demand of the system for more secretion, hypertrophy and are first noticed as a clinical entity. It is probable therefore that by the proper administration of iodine or thyroid extract to the mother with a colloid hypertrophy, fetal adenomas can be prevented to a great extent. The elimination of the fetal adenomas reduces the incidence of thyroid malignancy very markedly, as most malignant tumors of the thyroid arise from preexisting adenomas.

Contraindications to the Use of Iodine or Thyroid Extract During Pregnancy.—Iodine and thyroid extract are always contraindicated in adenomatous goiter during pregnancy as they cannot accomplish any useful end and only invite hyperthyroidism at an earlier date. In Graves' disease it is never advisable to use iodine as a curative meas-

ure. Its only indication is as a preoperative medication for lessening the toxicity of the patient. This is accomplished, presumably, by giving the patient a completely formed thyroxin molecule which is less toxic than the secretion which is normally given off in a patient suffering from Graves' disease, or in other words, temporarily transferring the secretion from that of a Graves' disease into that of an adenomatous goiter with hyperthyroidism which is less toxic than that of a Graves' disease. If the medication is continued, it loses its beneficial effect and produces a more marked hyperthyroidism than the patient had originally; in other words, its usefulness is outlived in approximately three weeks.

CONCLUSIONS

1. Colloid goiter is the one type most frequently encountered during pregnancy, and it is curable by administering iodine or thyroid extract.

2. The prevention of adenomas in later life can be accomplished by treating women with colloid goiter during pregnancy.

3. The elimination of adenomas greatly reduces the incidence of thyroid malignancy.

UTERINE PROLAPSE ASSOCIATED WITH SPINA BIFIDA IN THE NEWBORN, WITH REPORT OF A CASE

By I. H. NOYES, M.D., F.A.C.S., PROVIDENCE, R. I.

THE patient was a fullterm female infant, aged eighteen days. She was the tenth child, the others said to have been without congenital defects. The mother at once noticed an abnormal condition of the back which she feared was due to injury sustained by falling to the floor at birth during a precipitate labor. After a few days it became apparent that the right lower extremity was moved less than the left but the child nursed well and, aside from what was considered a "heat rash," seemed quite normal. When about two weeks old a protrusion through the vulva was noticed. This increased in size and so alarmed the mother that the advice of a physician was sought. On the following day the infant was taken to the hospital where a skiagraph of the spine was made but the child was not permitted to remain. Three days later I saw the patient, a poorly nourished infant with a large unruptured meningocele in the lower lumbar region and complete prolapse of the uterus and vaginal walls. The cervix protruded 5.5 cm. from the vulva, the corpus uteri could be palpated between the vaginal walls at the outer portion of the mass and a soft hernial sac could be felt above. The whole mass could be replaced within the body by exerting slight pressure but promptly reappeared when released. If the child cried or strained there was noticeable bulging of the whole ischiorectal region and a slight eversion of the anus. Two days later, after rupture of the meningocele had occurred, the child was seen again in consultation with Dr. Maurice Adelman. The baby was then moribund. The head, chest and abdomen showed nothing abnormal but the skin of the entire body was thickly covered with a punctate hemorrhagic

rash, presumably of several days duration. There was marked desquamation on the hands and around the ends of the fingers. Over the lumbar spine there was a ruptured spina bifida sac 7 cm. in diameter. The membranes were covered with a fibrinopurulent exudate. There was a very definite bony defect involving the fourth and fifth lumbar vertebrae. The reflexes above the umbilicus apparently were normal, but over the lower third of the abdomen and the lower extremities sensation



Fig. 1.—Posterior view showing meningocele and protruding cervix.



Fig. 2.—Perineal view showing complete prolapse of vaginal walls and bulging anus.

and voluntary motion seemed entirely lacking. Moderately severe stimulation of the sole of the left foot, however, resulted in a mass reflex involving all of the flexors of the left lower extremity and the lower third of the left rectus muscle. There was no apparent dribbling of urine, but the anal sphincter was lax and patulous.

Death occurred on the following day, twenty-two days after birth, presumably from transverse myelitis and septicemia. Autopsy was not obtained. (Figs. 1 and 2.)

Observation of this case stimulated me to investigate the literature in quest of other similar ones. While spina bifida is a relatively rare condition, estimated by Chaussier as occurring about once in one thousand births, the presence of uterine prolapse in association with it is apparently very much less frequent.

I have been able to find authentic reports of only twenty-four bona fide cases altogether and none since 1915. Of these only eight were published in the English language.

The first case was reported by Conovius in 1723, but no further reference to the condition was found until 1856 when W. H. Byford reported three cases. All three infants died within twenty-one days after birth. No explanation regarding the etiology of the prolapse was suggested.

During the following year Leach reported a case in which the prolapse occurred on the day after delivery. The lower limbs were paralyzed and death resulted supposedly from cerebrospinal meningitis after about three weeks.

In Quisling's case reported in 1889 the prolapse appeared on the eighth day, the child dying on the sixteenth. Here the perineum was said to be well developed, and the author believed there was no causal relationship between the spina bifida and the prolapse.

Schaeffer's case, reported the year after Quisling's, was a premature infant with an incomplete prolapse. When death occurred is not stated.

In 1894, Heil and Remy each reported a case. In one (Heil's) the sensibility of the lower limbs was disturbed and the reflexes and electrical reactions were abnormal. In the other the prolapse was not observed until the sixth day when it was entirely outside the vulva with the vagina turned inside out, but there was no rectal prolapse. Death occurred on the tenth day. Autopsy revealed no reason for the prolapse, but because of the spinal deformity the author attributed it to interference with the innervation of the parts.

Three cases were reported in 1897. (Hanssen, Ballantyne and Thomson, and Krause.) In Hanssen's case the prolapse occurred on the second day. There was also some protrusion of mucous membrane from the anus, which was open. The spinal tumor was operated upon, but the child died on the ninth day. He considered the prolapse a consequence of the spina bifida but believed that in this case it was of central nervous origin.

Ballantyne and Thomson obtained a very complete necropsy of the case reported by them, frozen sections of the pelvis being made and drawings compared with the pelvis of a normal female infant. They found that in the infant with prolapse the diameters of the false pelvis were below normal while those of the true pelvis were distinctly above the average.

Autopsy of Krause's case led him to believe that there was abnormal development and insufficient nourishment of the pelvic organs, poor development of connective tissue, lack of fatty tissue and flaccidity of the ligaments and muscles of the uterus.

In 1898, four cases were reported. (Dolérès, MacVicker, Perignon and Radwansky.) One of these (Radwansky's), however, cannot be included, as no mention is made of spina bifida being present. The child was delivered by a midwife and seen by Radwansky on the following day when the cervix protruded for a distance of 4 cm. Reposition was accomplished with some difficulty and recurrence was prevented by compress and bandage for a few days, the uterus remaining in its normal position thereafter. Six months later the genitals were perfectly normal on inspection and palpation. No abnormality, aside from the prolapse, was noted in this infant, but a spina bifida occulta cannot be ruled out as this was before the common

use of the x-ray. In the other three there existed double club-foot and paralysis of both lower extremities. In Doleris' case the anus was deformed with the mucous membrane protruding, and the last two lumbar and first sacral vertebrae were absent. Death occurred on the fourth day. In MacVicker's case the buttocks formed a pyramid with the anus at the apex. The child lived seven days, and at autopsy a section of the tissues of the gluteal region showed complete absence of muscular fibers. The author regarded this muscular weakness as the most potent factor in causing the prolapse. Perignon's patient was seen by him only once but was reported to have lived several weeks.

During the next ten years, from 1899 to 1909, reports of seven new cases were made: Purefoy, Jahn, Andrews, Burger, Walterhöfer, Nussbaum, and Parache each citing one case. Four of the infants died within fifteen days after birth, one lived eleven weeks, one four months, and the other died but the age was not stated. In this case the prolapse and the spinal defect were the only abnormalities. All but one had some deformity of the feet, and in three hydrocephalus was present. In Jahn's case the sacrum was defective in such a manner as to make the pelvis very small, and the author for some reason thought the prolapse was due to the narrow pelvis. Autopsy of Burger's infant showed the levator ani muscles to be completely degenerated, and he regarded this developmental defect as the cause of the uterine prolapse. Walterhöfer's case is of interest because, during an attempt to replace the prolapsed uterus, the bladder was ruptured. At the autopsy a communication was found between the bladder and the interior of the spinal canal. Nerves and blood vessels passed through this opening and spread out on the inside of the bladder wall. Nussbaum in a thesis published in 1908 reported his own case and reviewed some fifteen previously reported cases. He considered the spina bifida the indirect cause and the paralysis caused by it, with atrophy of the muscles of the pelvic floor, the direct cause of the prolapse. Parache's case was the one previously referred to as being free from abnormalities other than spina bifida and prolapse. The spinal lesion was in the lumbosacral region as in most of the others, but there were no paralytic symptoms in the sphincters or lower extremities, and the perineum was in perfect condition. This author considered the explanation of the interrelation of spina bifida of the lumbosacral region and prolapse impossible for, according to Gowers, the nerves governing the muscles of the perineum have their motor roots at the level of the third and fourth sacral vertebrae. However, spina bifida at this point has not been found to cause prolapse of the uterus.

Radwanska and Mayerhöfer each reported a case in 1913. One of these was first seen when three months old and was successfully operated upon for the spinal tumor. The associated prolapse was the only other abnormality except poorly developed or atrophied levator ani muscles. After leaving the hospital the child was lost track of, so the final outcome is unknown. Details of the other case are not given except to mention the presence of some cranial defect along with the spinal and uterine conditions.

Two years later Ebler and Duncker reported a case and in an extensive review of the literature cited sixteen previously recorded cases. Several of these are not included in this paper as no detailed reports or references were given. Their own patient was operated upon when eight days old for cure of the spinal tumor, but it died from meningitis fifteen days later. Microscopic study of the perineum showed it to be thin and infiltrated with fat. The individual muscle fasciculi were extremely small and in places almost like connective tissue.

A case reported by Thaler in 1916 does not properly belong in this group because of the fact that examination was not made until the menses had been established two years and the duration of the prolapse was not known. It is of interest, how-

ever, inasmuch as inspection and palpation of the sacral region revealed nothing unusual, but radiologic examination showed a congenital cleft in the first sacral vertebra.

A review of the cases reported leads one to conclude that the spina bifida is the primary etiologic factor in the occurrence of the prolapse. It would appear that if certain of the sacral nerves are drawn into the spina bifida there is a partial or complete paralysis of the musculature of the pelvic floor resulting in secondary atrophy.

On account of the high mortality in cases of spina bifida aperta, uterine prolapse associated with this condition is of little practical interest but, inasmuch as present methods of diagnosis prove that spina bifida occulta is much more frequent than was previously suspected, a thorough search for this condition in all cases of uterine prolapse in which the etiology is not evident may throw some light on the subject.

Ebeler and Duncker state that a study of 28 cases of uterine prolapse showed spina bifida occulta in over 28 per cent, whereas an equal number of women without prolapse used as controls showed the condition in only 10 per cent. Further investigation of this interesting phase of the subject would seem to be warranted.

REFERENCES

- Andrews, H. R.: Obst. Trans., London, 1902, xlv, 137. Ballantyne, J. W., and Thomson, J.: Am. Jour. Obst., February, 1897, xxxv, 181. Burger, O.: Arch. f. Gynäk., 1904, lxxiv, 407. Byford, W. H.: Am. Jour. Med. Sc., 1856, xxiii, 387. Conovius: Acta medicorum Berolinensium, dec. ii, 1723, i, 106. Doléris: Gynécologie, Par., 1898, iii, 220 and 309; also Bull. et mém. Soc. obst. et gynec. de Par., 1898, p. 114. Ebler, F., and Duncker, F.: Ztschr. f. Geburtsh. u. Gynäk., 1915, lxxvii, 1-19. Hanssen: München. med. Wehnschr., 1897, xlv, 1040. Heil, K.: Arch. f. Gynäk., 1894, lxxviii, 155. Jahn: Jahresb. d. schles. Gesellsch. f. vaterl. Kult., 1900, lxxviii, 146 (Med. Sec.). Krause, L.: Zentralbl. f. Gynäk., 1897, xxi, 422; also Medycyna (Warszawa), 1897, xxv, 52, 72. Leach, E.: Peninsular and Independent Med. Jour., 1858-9, i, 523. MacVicker, C.: Scot. Med. and Surg. Jour., 1898, ii, 32. Mayerhöfer, E.: Mitt. d. Gesellsch. f. inn. Med. u. Kinderh. in Wien, 1913, xiii, 67. Nussbaum, O.: Ein Fall von Prolapsus uteri incompletus bei einem neugeborenen Kinde mit Spina bifida, Würzburg, 1908. Parache, F.: Ann. de la Acad. de obst., etc., Madrid, 1909, ii, 176. Perignon: Jour. de se. med. de Lille, 1898, xxi, 561. Purefoy, R. D.: Dublin, Jour. Med. Sc., 1899, cviii, 345. Quisting, N.: Norsk Mag. f. Laegevidensk., 1889, 4 R., iv, 265. Radwanska, W.: Gynäk. Rundschau, 1913, vii, 515. Radwansky: München. med. Wehnschr., 1898, xlv, 52. Remy, S.: Arch. de tocol. et de gynec., 1894, xxii, 904. Schaeffer, O.: Arch. f. Gynäk., 1890, xxxvii, 244. Thaler, H.: Wien. klin. Wehnschr., 1916, xxix, 1121. Walterhöfer, G. O. W.: Zur Kenntnis der Spina bifida im Anschluss an einen Fall von Myelomeningocele lumbosacralis, combinirt mit Prolapsus ani et uteri, München, 1905.

SPINAL ANESTHESIA IN GYNECOLOGY, WITH A REPORT OF FIFTY CASES*

BY ARTHUR J. MURPHY, M.D., NEW YORK CITY

(From the Clinic of the Woman's Hospital)

IT IS occasionally necessary to perform major plastic operations on elderly patients who present contraindications to general anesthesia. In these cases spinal anesthesia has a very definite application. Furthermore, in preference to other methods of local anesthesia, it can be used to great advantage in many intrapelvic operations.

Spinal anesthesia was first used by Corning in 1885. At that time it was taken up enthusiastically both in this country and abroad, but, because of the frequent fatalities and the numerous postanesthetic sequelae, it soon fell into disrepute. These bad results were due to faulty technic, improper instruments, inaccurately prepared solutions of highly toxic drugs, improper selection of patients, and lack of knowledge of the proper care of these patients after the administration of the anesthetic. At the Woman's Hospital previous to 1924, there had been only two patients operated upon under this method, but with the many improvements that have taken place during the past five years, it has been taken up again, and fifty patients have been operated upon with spinal anesthesia during the past sixteen months.

PREOPERATIVE PREPARATION

The success of this method of anesthesia depends on four factors: the preoperative preparation, the technic, the care during operation, and the postoperative treatment. The preparation of the patient consists in explaining on the day before operation why this method is to be used; for instance, if she has some cardiac or pulmonary lesion, it is impressed on her how much safer it is not to have a general anesthetic and how much smoother her postoperative convalescence will be. She is told what to expect during the operation and how she is to conduct herself and, if possible, she is encouraged to talk to some other patient already operated upon under spinal anesthesia. The next day, one hour before operation, she is given $\frac{1}{6}$ grain of morphine and $\frac{1}{300}$ grain of scopolamine hypodermatically, which eliminates fear and discomfort from the strained position during operation. These details, seemingly insignificant, are essential for a successful anesthesia.

*Read at a meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, May 1, 1925.

INSTRUMENTS

In performing lumbar puncture, it is necessary to use a fine gauge needle, so that the opening in the dura readily closes and prevents leakage of the solution out of the spinal canal. Also, the needle should have such a short bevel, that after passing through the dura, it will not come in contact with the cord, and it should have a properly fitted stylet. At the Woman's Hospital, Doctor Labat's needles and syringe are used. These needles fulfill the above requirements, are made of nickel, and are unbreakable. The syringe, the glass barrel of which is graduated up to 10 c.c., has, at the proximal end, a strong metal shoulder which affords a firm grasp for the fingers; at the distal end, an eccentric tip for connecting and a bayonet lock for fixing the needle. Two needles and the syringe are sterilized by boiling for ten minutes in plain water; they are allowed to cool and are dried before being used.



Fig. 1.—Showing needles, syringe, and glass bulb with drug.

ANESTHETIC AGENT

It is important that the safest possible drug be used for introduction into the spinal canal. Of the commonly used local anesthetics, novocaine is the least toxic and the most effective. At the Woman's Hospital, neocaine, a French preparation of novocaine, is used. The drug is in crystal form and is put up in ampules containing accurate doses of ten and twelve centigrams; the former for patients weighing 150 pounds or less, and the latter for those weighing more than 150 pounds. When ready for use, the ampule is sterilized by immersion in alcohol for ten minutes; the top of the ampule is removed, and the bulb containing the novocaine crystals, which has a capacity of three cubic centimeters, is filled with spinal fluid to dissolve the drug.

PREPARATION OF PATIENT

As soon as the patient arrives in the operating room she is placed in a sitting position across the table with the head and back arched forwards. A wide area, extending from the angles of the scapulae to the

level of the sacrococcygeal joint, is painted with iodine and surrounded with sterile towels. In the meantime, the anesthetist has had the instruments and the ampule containing the drug sterilized and made ready for use.

SITE OF PUNCTURE

The site of puncture of the spinal canal depends on the extent of anesthesia required and the operation to be performed; for any vaginal operation injection between the second and third lumbar vertebrae, and for any abdominal operation injection between the twelfth dorsal and first lumbar vertebrae gives satisfactory results.

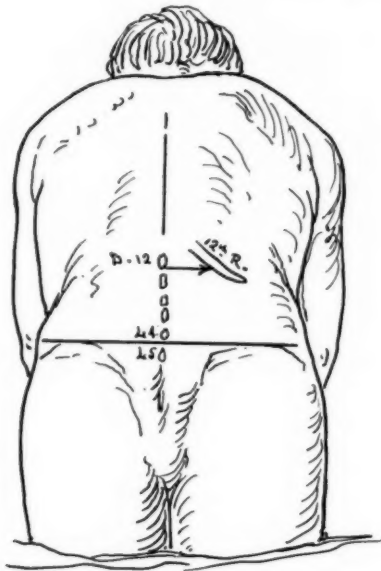


Fig. 2.—Showing anatomic landmarks for spinal anesthesia.

LANDMARKS

To locate the desired level at which the solution is to be introduced, two important landmarks, the twelfth rib and the crest of the ilium, must be noted. The twelfth rib on either side is located at its anterior extremity and traced towards the median line of the back; a perpendicular, measuring 5 cm., dropped from a point on this rib to the median line indicates the site of the twelfth dorsal vertebra. A horizontal line joining the highest points of the iliac crests either passes over the fourth or between the fourth and fifth lumbar vertebrae. Also, by slowly passing the second finger over the median line, from above downward, the alternating elevations of the spinous processes and the depressions of the intervertebral spaces can be appreciated.

TECHNIC

Following Labat's technic, the skin over the desired intervertebral space is stretched between the thumb and second finger of the left hand, while the first finger indicates the exact median line. With the right wrist of the operator supported against the back of the



Fig. 3.—Showing method of injecting spinal anesthesia.

patient, the needle, held in the exact median line and perpendicular to the surface, is introduced through the skin with a quick thrust. It is very slowly and carefully advanced through the interspinous ligament until the dura is punctured when a very definite sensation, as of a needle passing through a thin, stiff piece of paper, is imparted to the fingers. The stylet is removed from the needle and the bulb containing the novocaine crystals is filled with spinal fluid, taking care

not to lose any more fluid than is necessary. The novocaine crystals are readily dissolved by aspirating the fluid back and forth in the syringe; the solution is then drawn into the syringe and the air is expelled. The syringe, with its plunger supported by the thumb, is held in a horizontal position while the aspirating needle is disconnected. It is then connected with the intraspinal needle and care should be taken not to dislodge its position in the canal. To dilute the solution and to be certain that the needle is still in the canal, one or two cubic centimeters of spinal fluid are drawn into the syringe. The solution is slowly injected; and, at the completion of the injection, the needle with the syringe still attached is rapidly withdrawn from the spinal canal. With this technic the spinal puncture is done neatly, without injury to the cord or its blood vessels, and with little discomfort to the patient.

As the solution is injected very slowly and with slight pressure there is but little diffusion within the canal; and, being absorbed at the site of puncture, it produces at that level a physiologic section of the posterior nerve roots. The result is complete anesthesia of the portions of the body supplied below that level. The anesthesia begins almost immediately and the average duration is one hour.

CARE DURING OPERATION

With the completion of the intraspinal injection, the patient is immediately placed flat on her back and with the head lowered. This position increases the circulation in the brain and counteracts the bad effects which occasionally occur from anemia of the bulb. The arms, instead of being placed under the hips as is usually done, are placed in a comfortable position across the chest. Everything is done to promote the comfort of the patient, for frequently she complains more of her uncomfortable position than of the entire operation.

Throughout the operation a careful record is kept of the pulse and respirations. No cardiac or respiratory stimulants are given routinely; but if the patient should show signs of cardiac or respiratory collapse, caffeine and adrenalin may be given hypodermically. Although, during operation, spinal anesthesia cases should be carefully watched and cared for, but little actual treatment is necessary.

POSTOPERATIVE CARE

When the operation is finished the patient is transferred from the operating table to her bed while in the Trendelenberg position; for occasionally the sudden changing of her position at the end of operation causes fainting and circulatory collapse. The foot of the bed is kept elevated for two hours; and, at the end of that time, if the patient's blood pressure is normal, the bed is leveled. One hour after

operation she is given a cup of coffee or water by mouth. Should her condition be serious, however, the coffee is given *per rectum* immediately. At the end of two hours the patient is allowed liquids, and on the following day, soft diet.

Following operation the pulse and respirations are recorded every fifteen minutes until the patient's condition is satisfactory. The majority of these patients have a smooth and uninterrupted convalescence.

INDICATIONS

In gynecologic surgery spinal anesthesia is indicated whenever there are contraindications to general anesthesia. In elderly patients, on whom major plastic operations must be performed, it is often a method of election.

CONTRAINDICATIONS

The only contraindications to the intraspinal method are blood pressure below one hundred, and a deformed spine; at times, even in these cases, it becomes necessary to resort to spinal anesthesia.

ADVANTAGES

In pelvic surgery, the complete muscular relaxation, flaccid bowels, and decreased bleeding add to the efficiency and rapidity of the operation; while in plastic surgery, the decreased bleeding is a distinct advantage over general anesthesia.

The slight postoperative distention, decreased vomiting, lessened pain, and the rarity of lung and kidney complications contribute to a normal postoperative course. In other words, although patients operated on with spinal anesthesia have more or less discomfort and at times slight pain during the operation, they certainly have a much safer and smoother convalescence.

ANALYSIS OF CASES

In this series of fifty cases the average age was forty-six years, the youngest was twenty-five, the oldest seventy-two. Thirty-two of the fifty cases were over forty years of age. Spinal anesthesia was an elective method in thirty-three cases; twenty of which had plastic operations, and of these seventeen were in women over forty. This method was used in the remaining seventeen cases because of the following indications: chronic myocarditis, chronic nephritis, hypertension, angina pectoris, pulmonary tuberculosis, emphysema, asthma, diabetes, and acute nasopharyngeal infection.

The cases were classified, according to the operation performed, as vaginal, abdominal and combined vaginal and abdominal. Thirty-one cases had vaginal, fifteen cases abdominal, and four cases combined operations.

Of the thirty-one vaginal cases, eight had vaginal hysterectomies; seven had interposition operations; thirteen had major plastic operations (dilatation and curettage, amputation of the cervix, operation for cystocele and rectocele, and perineorrhaphy); one had a dilatation and curettage with insertion of radium; one had a dilatation and curettage for therapeutic abortion, and one had radium inserted for epithelioma of the vulva.

Of the fifteen abdominal cases, ten had supravaginal hysterectomies, two had operations for umbilical herniae, one for a femoral hernia, one had a hysterotomy with sterilization, and one case had spinal anesthesia twice for a two-stage Mikulicz operation.

Of the four combined cases, two had a dilatation and curettage, amputation of the cervix, bilateral salpingectomy and appendectomy; one had a perineorrhaphy, myomectomy and appendectomy; and one had a dilatation and curettage, operation for retroversion and appendectomy.

TABLE OF OPERATIONS PERFORMED WITH SPINAL ANESTHESIA

	NUMBER OF CASES	SUCCESS	PARTLY SUCCESS	FAILURES
<i>Vaginal Operations</i>				
Vaginal hysterectomies -----	8	6	2	0
Watkins' interposition -----	7	6	1	0
Dilatation and curettage, amputation of cervix, repair cystocele and rectocele, perineorrhaphy -----	12	11	1	0
Insertion of radium—malignancy of vulva -----	1	1	0	0
Dilatation and curettage, insertion of radium -----	1	1	0	0
Dilatation and curettage for therapeutic abortion -----	1	1	0	0
Removal of urethral hemorrhoid-----	1	1	0	0
<i>Abdominal Operations</i>				
Supravag. hysterectomy -----	10	7	3	0
Repair umbil. hernia-----	2	2	0	0
Repair femoral hernia-----	1	1	0	0
Hysterotomy, resection of tubes-----	1	0	0	1
Mikulicz operation—two stages-----	1	1	0	0
<i>Combined Operations</i>				
Dilatation and curettage, amputation of cervix, bilateral salpingectomy, appendectomy -----	2	0	0	2
Perineorrhaphy, myomectomy, appendectomy -----	1	0	0	1
Dilatation and curettage, appendectomy, operation for retroversion -----	1	1	0	0
Total -----	50	39	7	4
		(78%)	(14%)	(8%)

RESULTS

The average duration of the anesthesia was one hour, but in one case it was complete for ninety and in another for seventy minutes. To prolong the anesthesia in two difficult cases that had vaginal hysterectomy, caudal anesthesia was successfully combined with the intraspinal method.

It is interesting to note the number of cases that did not vomit during or after their operation. Of the thirty-one patients that had vaginal operations, twenty-one did not vomit, while ten vomited an average of three times. Of the nineteen patients that had abdominal and combined operations, nine did not vomit, while ten vomited an average of four times. Of the fifty patients that had either vaginal, abdominal, or combined operations, a total of thirty, or 60 per cent, did not vomit.

Abdominal distention was practically negligible in those patients who did not vomit, and in those who did, it was not so troublesome as the distention following general anesthesia.

The results of the anesthetics were classified as successful, partly successful, and failures. The successful cases were those that did not require any other anesthetic. The partly successful cases were those that required, mostly for its psychic effect, a small amount of open drop ether at the beginning or end of operation. None of the partly successful cases had more than one and one-half ounces of ether nor were they at any time unconscious. The failures were those cases that required a general anesthetic subsequent to the intraspinal method.

Of the thirty-one cases that had vaginal operations, twenty-seven, or 87 per cent, were successful, and four cases, or 13 per cent, were partly successful. There were no failures. Of the fifteen cases that had abdominal operations, eleven, or 73 per cent, were successful; three cases, or 20 per cent, were partly successful, and one case, or 6 per cent, was a failure. Of the four cases that had combined operations, one, or 25 per cent, was successful, and three, or 75 per cent, were failures. This makes a total of thirty-eight cases, or 78 per cent, successful; seven, or 14 per cent, partly successful, and four, or 8 per cent, failures. There were no fatal cases nor were any of the patients at any time in a serious condition.

It is obvious from these results that, on the one hand, spinal anesthesia gives excellent results in vaginal and satisfactory results in intrapelvic surgery, and on the other, that the results in combined operations are very uncertain.

It is probable that changing from the lithotomy to the supine positions, the resultant loss of time, the consequent stirring up of the patients, and that the abdominal incisions, through very sensitive

structures, were made when the anesthetics were beginning to wane, accounts for the failures in those patients that had combined operations.

Considering the uncomfortable position of these patients during vaginal operations, that all of the operations with the exception of four lasted from fifty to seventy minutes, and that many of the operations were very difficult, the anesthetics were put to a severe test.

CONCLUSIONS

1. That spinal anesthesia is a rapid, effective anesthesia and conducive to a normal convalescence.
2. With the correct technic and the proper selection of patients, the increased safety of spinal anesthesia seems to justify its more liberal use.
3. When general anesthesia is contraindicated in women requiring gynecologic surgery, either plastic or abdominal, spinal anesthesia gives excellent results.
4. In plastic gynecologic surgery in elderly women spinal anesthesia should be more often used as an elective method.

For the privilege of carrying on this work I desire to express my appreciation to Dr. George Gray Ward, Chief Surgeon to the Woman's Hospital, and also to Dr. Gaston Labat, Consulting Anesthetist to the Woman's Hospital, for their kindness and patient instruction.

121 EAST 60TH STREET.

OBSERVATIONS ON THE USE OF CASTOR OIL, QUININE, AND PITUITARY EXTRACT IN THE INDUCTION OF LABOR

By ALBERT MATHIEU, M.D., F.A.C.S., PORTLAND, OREGON

THE value of castor oil, quinine and pituitary extract in the induction of labor has not received the proper recognition by obstetricians, notwithstanding the contributions of Watson^{1, 2} and others. Additional data will probably be welcome.

Regardless of propaganda for prenatal care and the great volume of matter written on the subject, sufficient stress has not been laid on the one safe method of combating and defeating many of the abnormalities found during the prenatal period and at term.

The probable reason induction of labor is rather reservedly used by obstetricians, and scarcely thought of by the general practitioner, is its formidableness when done with bags or bougies. The dangers of the bag and bougie are numerous. Intrauterine manipulation, early rupture of the membranes, dislodgment of the presenting vertex, the occasional concealing of hemorrhage, prolapse of the cord, maceration of the cervix and the jeopardizing of the patient in case cesarean section has to be resorted to, do not obtain when the induction is made with castor oil, quinine and pituitary extract.

Much of the advantage of prenatal care is lost when one allows the head of the fetus, by sheer growth, to reach a stage of marked disproportion with the pelvis of the mother who carries it, when induction will avoid this complication.

Women with histories of rapid or precipitate labors, or with thin, dilated cervices at term, should not be allowed to suffer precipitate labor while on the way to the hospital. Nor should those with toxemia, progressive, in spite of treatment, be further endangered by delay. The woman at term who is suffering distress and discomfort due to pain, pressure, insomnia and nervous anxiety, should not be permitted to reach the stage of exhaustion because one wishes to let Nature take her course. Nor is it good obstetrics to allow a woman near term, whose membranes are ruptured, to go longer than twenty-four hours without inducing labor.

The following series of cases is analyzed and offered as additional corroborative evidence of the value of castor oil, quinine and pituitary extract in the induction of labor. This series is composed entirely of cases from my private practice, who had strict and active prenatal care and who were under close observation during the antenatal, natal and postnatal periods. This series also comprises all of the inductions done by me in the last five years. None have been omitted.

There are 91 cases in all, 52 primiparae, and 39 multiparae. Eighty-eight of the inductions were successful (96.7 per cent), in three it failed (3.3 per cent). The failures were all in primiparae.

INDICATIONS

In this series of 91 cases the indications are shown in Table I.

TABLE I

Postmaturity	30
Large baby*	16
Distress and discomfort*	8
Fear of precipitate*	4
Premature rupture of membranes*	8
Multiple fibroids*	1
Toxemia	11
Large baby at term	8
Premature rupture of membranes	3
Bilateral pyelitis	1
Chronic pulmonary tuberculosis	1
	91

*These cases were also postmature.

METHODS

The method used is a modification of the method described by Watson. I have overcome the main objectionable feature of the Watson method by reducing the dose of pituitary extract to three minims. This dose seems to be less harsh and I have never found it to raise the blood pressure more than five points. I have also attempted to concentrate the actions of the castor oil, quinine, and pituitary extract and the enema in such a way as to make their actions more or less simultaneous. I have also used a greater number of injections of pituitary extract before conceding failure. This modification I think has given a slightly higher percentage of successes. The method is as follows: In the hospital, the patient is given two ounces of castor oil and ten grains of quinine sulphate and exactly two hours afterward, a hot soapsuds enema is given and as the enema is about to be expelled, three minims of pituitary extract are given by hypodermic. This same dose of pituitary extract is repeated by hypodermic every thirty minutes until labor starts and *no longer*. From then on, the labor is conducted as though the onset had been normal. Failure is admitted and the procedure stopped if eight hours pass without labor being started or if there is absolutely no sign of any effect toward the induction or if the continual use of the hypodermic is too trying to the mother. In such cases, the procedure is stopped, the mother is given an hypnotic or sedative and after twenty-four or forty-eight hours, the induction is again started.

In only eight cases, because of urgency and with the cooperation of the mother, were more than twelve hypodermic injections of pituitary extract given. Nearly all of these inductions were made by my own special nurse, who remained with the patients during the induction and subsequent labor. This nurse has reached a high state of efficiency in the recording of the fetal heart, rectal examination and in noting the progress of the induction and the labor. There were some cases in which labor had apparently started but in which after an hour or two, the contractions had disappeared entirely. In these cases the injections of pituitary extract were started again in the routine manner.

FAILURES

In the entire 91 cases in this series, there were three failures; all in primiparae, 3.3 per cent. The cases in which the induction with castor oil, quinine and pituitary extract were unsuccessful are detailed below.

CASE 1.—The indication in this case was a large baby with the head floating, at term, in which I was unable to fit the head into the pelvis; and the routine was stopped after 14 injections of pituitary extract without regular contractions. Labor began normally forty-eight hours later and was followed by a normal delivery. The baby weighed 4390 grams, and there was no morbidity of mother or child.

CASE 2.—The indication was a large head that could not be fitted into the pelvis. After the second attempt at induction, the head fitted well into the pelvis. Labor commenced normally six days later and was terminated with a left lateral episiotomy and low forceps. The baby weighed 4200 grams, and there was no morbidity in mother or child.

CASE 3.—The indication was a severe recurrent bilateral pyelitis due to colon bacillus infection. This patient was in a very serious condition, but because of religious beliefs, induction was prohibited until the period of viability arrived. There were two failures with castor oil, quinine and pituitary extract, and then bagging was resorted to because of the urgency, and was successful. The baby weighed 2324 grams. There was postpartum morbidity of the mother in this case due to the pyelitis and the case is again considered under "morbidity."

MORBIDITY

There were four cases of morbidity (patients who had rises of temperature up to 100.4° on two different days). (4.4 per cent.)

CASE 1.—This patient had lost her first baby at birth because of toxemia. She had chronic nephritis and developed severe toxemia in the last month of pregnancy. Treatment for two weeks in the hospital did not control the toxemia, hence, labor was induced. The first effort at induction failed, but the second was successful, and she had a normal delivery. The baby was born in good condition and weighed 3370 grams. The patient developed a mild degree of phlebitis of the right leg and left the hospital in the sixth week with her baby; both in good condition.

CASE 2.—This woman had severe bilateral pyelitis from the fifth month of pregnancy and was in the hospital from that time until her baby was born. Because of religious beliefs induction was prohibited until the period of viability arrived.

There were two failures with castor oil, quinine and pituitary extract and the bag was resorted to because of urgency. The baby was delivered by low forceps and left lateral episiotomy. There was a recurrence of the pyelitis four days after the delivery but this very soon improved and the patient left the hospital in the fourth week in good condition. Baby weighed 2324 grams at birth and left the hospital with the mother; both in good condition.

CASE 3.—This patient was delivered normally except for a median episiotomy. She had a temperature on the fourth day of 101.6° and on the sixth day a temperature of 100.4° due to nonsuppurative mastitis.

CASE 4.—Labor was induced in this patient because of contracted pelvis. After a test of labor of many hours, a cesarean section was done because the head did not engage or could not be fitted in and definite disproportion existed. She suffered considerable primary shock. On the fifth day, after a chill, her temperature rose to 104° . On the sixth day there was another chill and a fever of 105° . At this time colon bacillus was found in a cultured, sterile collected specimen of urine. There seemed to be no other basis for the fever. Following treatment, she improved at once. She left the hospital in the third week with her baby, both in good condition.

In the total series of 91 cases, there was no morbidity of the babies which could be attributed to either the induction or the type of delivery and there were no maternal deaths or fetal deaths, either early or late.

SUCCESSSES

Sixty-two inductions were successful on the first attempt, twenty were successful on the second attempt and six required three attempts before success was obtained.

In 39 multiparae, all of which were successful, the average number of hypodermic injections of pituitary extract necessary was six and one-half; and in 52 primiparae, the average number of injections in the successful cases was six; and in the failures, ten and one-half. The multiparae averaged three and eight-tenths hours in labor, the longest labor being nine and one-half hours; the shortest being three-quarters of an hour. In 52 primiparae, the average hours of labor was nine and one-tenth. The longest labor was twenty-two and one-half hours; the shortest, two hours.

CONCLUSIONS

In this series of 91 cases in which induction of labor was successful in 96.7 per cent with castor oil, quinine and pituitary extract, there were no maternal deaths and no fetal deaths, either early or late.

There were eight cases in which there was early rupture of the membranes (after labor had commenced but before the cervix was dilated two fingers). This had no bad effect on the labors, and there was no morbidity. The longest labor in this group was eight and one-half hours in a primipara, and the shortest was one hour in a multipara.

There were two cesarean sections in the series; in both of which was a serious doubt as to whether or not the patients could deliver due

to disproportion and inability to fit the head into the pelvis. They were both primiparae and induced at term with the idea of giving them a test of labor. One was a woman of eighty-five pounds, with a just minor pelvis and hydramnios; after having been in hard labor for four hours, with the cervix dilated to four fingers, the head was still floating and could not be fitted into the pelvis. The other was a short, stocky woman with a funnel type pelvis; after several hours of real hard labor, the head had not engaged and could not be made to engage. The first made an uneventful recovery, and the second is detailed as Case 4, under the heading "morbidity."

The termination of labor in the entire number of cases was as follows: normal thirty-three; low and midforceps, fifty-one; version and breech extraction, five; cesarean section, two. The average weight of the babies was 3848 grams, the largest baby weighed 4734 grams and the smallest 1927. There were twenty-three babies that weighed over 3800 grams and three that weighed under 2200 grams. There were 92 babies in all, one mother having twins. There were 91 vertex presentations, one of these having been converted from a breech presentation before labor, and one breech presentation.

In two of the three failures, the head which before labor was floating, could not be fitted into the pelvis, and showed signs of disproportion, fitted well down into the pelvis during the attempted induction and removed the indication for the induction.

It appears advantageous to modify the method of Watson by giving only three minims of pituitary extract instead of $\frac{1}{2}$ to 1 c.c., and by giving the first dose of pituitary extract as the enema is being expelled, and furthermore, by continuing the attempt at induction over a longer time than he advises.

REFERENCES

- (1) *Watson, B. P.*: AM. JOUR. OBST. AND GYNEC., 1920, i, 70. (2) *Watson, B. P.*: AM. JOUR. OBST. AND GYNEC., 1922, iv, 603.

545 MEDICAL ARTS BLDG.

IS THE SEDIMENTATION TEST OF PRACTICAL VALUE IN GYNECOLOGY?*

BY PHILIP F. WILLIAMS, M.D., PHILADELPHIA, PA.

(From the Gynecologic Service of the Graduate School of Medicine of the University of Pennsylvania)

THE early work of Fahraeus and Linzenmaier on the phenomenon of sedimentation of the red blood cells as a method of diagnosis and prognosis has until fairly recently received but little attention in American literature. The mechanics underlying this phenomenon and the technic of the test have been so thoroughly discussed in the recent papers of Friedlaender, Baer, and Cherry, that they need not be repeated here. Suffice it to say that when an anticoagulant, as sodium citrate, is added to blood the red cells settle by gravity through the citrated plasma in varying degrees of rapidity depending upon the state of health of the individual, the acuteness of any infectious process present and the composition of the blood at the time the sample is taken, with reference to hemoglobinemia and hydremia. The time for sedimentation of the blood cells to the 18 mm. mark on the tubes recommended by Friedlaender in normal healthy individuals varies. Friedlaender estimates the time in normal women between 600 and 1000 minutes, which he states are lower than the normal figures obtained by Linzenmaier. Baer estimated the time in normal individuals to range between 130 and 224 minutes.

The earlier work in this line of research was upon the value of the phenomenon as a means of diagnosis of pregnancy, as it was found that in pregnant women a rather rapid rate of sedimentation occurred in contrast to healthy nongravid individuals. Practically the test was of little value as the quickening of sedimentation does not occur until pregnancy is so far advanced that there should be no unusual difficulty in making the diagnosis by physical findings. Upon attempting to use the method as one of differential diagnosis with some of the conditions commonly mistaken for pregnancy it was found to be of limited value, as some of these conditions showed as fast a sedimentation time as did pregnant women.

When the test was applied to other classes of diseases, particularly pelvic infections, the rate of sedimentation was found to correspond rather closely with the severity of the infection, in some instances apparently more closely than did the temperature curve or the leucocyte count. From this standpoint the method becomes one of un-

*Read at meeting of the Philadelphia Obstetrical Society, April 1, 1926.

doubted prognostic importance. In acute pelvic infections Friedlaender found the time of sedimentation to be very fast, and believes that the rapidity of sedimentation bears a direct relationship to the severity of the infectious process, and that it forecasts with a greater degree of accuracy the state of the pathologic process than either the temperature or the leucocytes. In comparison with other less frequently used means of prognosis in pelvic inflammatory conditions, such as the hematoclastic crisis test of Widal, capillary circulation and blood chemistry, it was found that much more reliance could be placed upon the sedimentation test. His study has led him to propound several postulates, namely, that with a sedimentation time of less than thirty minutes an active infection is present; with the time under one hour a latent infection exists, and operation should be deferred. But with a sedimentation time of over 120 minutes all possibility of a latent or active infection can be excluded and the patient can safely undergo operation.

From a study of the results tabulated in various articles it would seem that a most valuable application of the test would be in prognosticating the most favorable time for operation in pelvic infections. Here as Friedlaender states the temperature and the leucocytes may be normal after a period of conservative treatment and yet a stormy convalescence follow operative interference. Here he claims it is well to regard the sedimentation test as a barometer, and operate only after a sedimentation time of 120 minutes has been reached. Baer and Reis conclude that patients with pelvic inflammatory conditions should not be operated upon until a sedimentation of 45 minutes has been obtained. When this rule was disregarded and operation performed a rough postoperative period followed. Baer and Reis also feel that the time of sedimentation is directly proportional to the virulence of the infection and serves as a more delicate prognostic index than either the leucocytes or the temperature. Cherry feels that, while the test is simple and may yield information as to the progress of the infection more quickly than the leucocyte reaction, it has not in his hands indicated the degree of virulence of infection, nor has he found that a low time of sedimentation necessarily signifies that a bad prognosis should be given. He also feels that the leucocyte reaction, being less easily influenced and more stable, therefore more clearly and definitely indicates the proper time for operation.

With a view of studying this test as a means of prognosis it was added in October as a routine for all admissions on the gynecologic service in the Hospital of the Graduate School of Medicine and eighty cases were studied. The technic recommended by Friedlaender was followed, and the test was repeated with all leucocyte counts so that a comparative study might be made.

The test was applied in ten cases of myoma (Table I). The first case was one in which multiple subserous and a large extruded and gangrenous submucous myomata were complicated by peritonitis. Death occurred three days after admission. The second case was complicated by chronic purulent salpingitis, was operated upon, and did not have more than the usual febrile reaction to operation. The temperature was elevated to 101° once. This case was discharged eighteen days after operation. The third case was complicated by a severe anemia and a serious mitral regurgitation, the hemoglobin was 40 per cent and the red cell count 2,100,000. The operation was followed by an uneventful convalescence, and she was only in the hospital longer than usual on account of the anemia. From admission to discharge the sedimentation time only rose eight minutes. It is likely that in this instance the composition of the blood influenced the time of sedimentation. The other cases showing a low sedimen-

TABLE I
MYOMAS

S. T. IN MINUTES	LEUCOCYTES	TEMPERATURE
11	33,650	103
7	7,250	101
15		
23 (10 d. p. o.)	8,050	98
30	6,500	98
65	7,000	98
23	6,100	98
90	8,300	98
135	9,800	100
140	6,000	98
66	5,900	98

tion time did well after operation, there being no morbidity. It would seem therefore that in the five cases in which the test gave evidence of an acute infection being present no definite prognostic information was obtained.

The second chart (Table II) shows a series of miscellaneous gynecologic conditions. Both the cases of pelvic abscess were operated soon after admission. The temperature dropped at once, and was followed by some fluctuation as the pelvic debris sloughed away. The initial sedimentation times of 12 and 22 minutes rose in ten days each to 56 and 43 minutes. Two cases of vulvar abscesses opened at once showed initial readings of 10 and 27 minutes, which rose to 65 and 35 minutes in five days, when the patients were discharged. The second case had a subacute salpingitis and a positive Wassermann reaction; these factors may have retarded an expected rise in the time of sedimentation after the pus cavity was evacuated. The case of inguinal granuloma showed an initial reading of 3 minutes; this was confirmed

by a repeated test a few hours later. After the large vulvar growths were removed with the cautery, and antimony injections begun, the reading rose to 10 minutes. The large area of surface infection may have been the occasion of such a quick sedimentation time.

TABLE II

DIAGNOSIS	S. T.	LEUCOCYTES	TEMPERATURE
Pelvic Abscess	12	8,150	100
(10 d. p. o.)	56	7,000	99
Pelvic Abscess	22	11,400	103
(10 d. p. o.)	43		
Vulvar Abscess	10	10,500	101
(5 d. p. o.)	65		
Vulvar Abscess	27	10,000	99
(5 d. p. o.)	35		
Granuloma Ing.	3	7,200	98
(10 d. p. o.)	10		
Carcinoma Vulva	18	13,000	101
Bartholinitis Chronic	80	6,000	98
Tuberculosis of Vulva	55	7,300	98
Cystitis	67	7,400	100
Lacerated Perineum	216	6,800	98
Lacerated Perineum	128	8,800	98
Endometritis	46	14,000	99
Pelvic Adhesions	61	7,300	98
Ovarian Cyst (Infected)	240	14,600	102
Hydrosalpinx (Tuberculous)	40	7,200	98

In a group of cases of parturitional pathology the time of sedimentation was definitely lower in the febrile than in the apparently noninfected cases of abortion. In the cases of puerperal pyelitis the time was moderately low, 11, 15, 15 and 21 minutes, on admission, and did not show a marked rise coincident with the clearing up of the urine, the lowering of the temperature and a drop in the leucocytes. If all confidence might be placed in the test these figures would tend to show that an infection persisted in spite of the clearing up of the clinical picture. Two cases of pernicious vomiting showed readings of 56 and 120 minutes, while in four cases of toxemia of late pregnancy the time ran about 25 minutes in each. However, many cases of normal pregnancy run as low a time as this, and whether toxemia resulting from disturbed metabolism has the same influence as the toxemia from an infectious process on the sedimentation of red blood cells is not known.

It is in the infections and inflammations of the uterine adnexa that need arises for the most careful judgment as to the earliest opportune time for surgical interference. On our service for the most part conservatism is practiced up to a certain point, and operation deferred until the temperature has been normal or nearly so for some days, with a stationary or falling leucocyte count. Such observations coupled with the general clinical picture and the local physical findings have been our guides in determining when to operate. In such con-

ditions the addition of a trustworthy prognostic index, as simple in carrying out as the sedimentation test, would be quite welcome, were it to forecast the need for drainage, the possibility of postoperative peritonitis, ileus or other worrisome complication. In a group of thirty cases of chronic or subacute salpingitis, oophoritis and old pelvic peritonitis in which the temperature (not over 102°) and leucocytes (not over 12,500) were but moderately elevated on admission, several were found to have sedimentation times below 10 minutes, and

TABLE III
CHRONIC OR SUBACUTE SALPINGITIS, S. T. BELOW 30 MIN.

	S. T.	LEUCOCYTES	TEMPERATURE	
1	6	10,350	102	
2	7	7,250	100	
3	7	6,400	99	
4	8	7,000	99	Postoperative Peritonitis
5	12	10,000	101	
6	15	7,600	99	
7	15	8,400	98	
8	21	8,000	101	
9	22	6,000	98	
10	30	6,200	100	

some others below twenty minutes (Table III). Yet all these women were operated upon with but one postoperative flare-up which caused any concern. This case of recurrent salpingitis after a pelvic débridement ran a postoperative temperature to 103° for three or four days, with marked distension and vomiting. She cleared up and was discharged with a negative pelvis on the twenty-second day after operation. Nor in these cases did the sedimentation time appear to be in entire accord with the nature of the pathology discovered at operation, for in several instances quite well-defined tuboovarian abscesses were found in cases which showed among the slowest time of sedimentation.

In a group of ten cases of salpingitis (Table IV), entering with well-marked pyrexia and with fairly elevated leucocyte counts and with a clinical picture of a much more acute process, the sedimentation time was 25 minutes or below in all but one case, denoting apparently the presence of a very active lesion. The sedimentation time in its rapidity was much more on a par here, than in the previous series, with the clinical picture and other observations. Operation was done in all these cases as soon as was feasible after admission. Drainage was used in but two cases. In only one case was there postoperative morbidity of note; in this instance a postoperative pelvic peritonitis was complicated by an acute upper respiratory process. No case remained in hospital more than twenty-one days after operation. In these cases the final sedimentation time taken before discharge did not show any marked rise, not reaching over 200 minutes

in any case. Whether the residual traces of inflammatory exudate present in the pelvis would account for this is uncertain. Indeed the final pelvic examinations were considered quite satisfactory in the way of immediate end-results.

TABLE IV
ACUTE SALPINGITIS, S. T. BELOW 30 MINUTES

	S. T. ON ADMISSION	S. T. ON DISCHARGE	LEUCOCYTES	TEMP. AT TEST	POSTOPERATIVE MORBIDITY
1	15	55	16,000	103	none
2	25		14,000	102	none
3	22	38	18,000	101	none
4	20	63	18,000	101	none
5	15	40	19,600	102	drain—101
6	15	56	19,000	102	drain—102—cough
7	14	86	22,500	100	none—tuberculosis
8	80	200	18,400	102	none
9	15		15,000	100	none
10	10	20	13,000	100	none

Whether the sedimentation time would be lower in a first infection or in the flare-up of a recurrent attack of salpingitis was not determined, nor whether the sedimentation time was more rapid in the postabortal pelvic inflammations than in gonococcal salpingitis was not determined. It has been impossible to note any influence of latent syphilis upon the speed of sedimentation. In several instances it was possible that a rather marked anemia might have been partly responsible for the rapidity of sedimentation in cases in which such findings might not have been expected.

CONCLUSIONS

The sedimentation test, while simple and easy to carry out, has not seemed to be consistent in expressing the reaction of the body to the disease process nor to the nature of the pathology as found at operation.

A rapid sedimentation time has not been found to presage any unusual degree of postoperative morbidity.

In comparison with this test the temperature curve and the study of the leucocytes remain as more stable and reliable indices for diagnosis and prognosis.

REFERENCES

- Friedlander, B.*: AM. JOUR. OBST. AND GYNEC., 1924, vii, 125. *Baer, J. L., and Reis, R. A.*: AM. JOUR. OBST. AND GYNEC., 1925, x, 397. *Cherry, T. H.*: AM. JOUR. OBST. AND GYNEC., 1926, xi, 105.

(For discussion see page 261.)

NARCO LOCAL ANESTHESIA IN CESAREAN SECTION*

BY F. E. KELLER, M.D., PHILADELPHIA, PA.

IT IS not within the scope of this paper to offer any suggestion for modification of operative procedure to be adopted in performing cesarean section nor to deviate to any great extent from the classical Snger operation. The type of procedure submitted will be detailed with defects as well as advantages. The technic is developed from successive cases, and I would assume that a dogmatic rule of thumb would not fit all cases, but that each must have a considerable amount of individual consideration and study before deciding upon the method of choice for that particular case.

Hence it seems hardly likely, notwithstanding suggestions to the contrary, that narco local anesthesia should be considered in all cases requiring delivery by this method. In a markedly prolonged operation such as the extraperitoneal section, or in cases of ruptured uterus or placenta previa, where time is a great factor, it would seem that a general anesthetic must remain the choice.

In all the patients whom I have subjected to narco local section, there has been, I believe, a contraindication to the use of ether. The conditions present have been as follows: chronic endocarditis and myocarditis with decompensation, chronic pulmonary tuberculosis, acute bronchitis with prolonged gestation, pyelitis with infection of the kidneys, hyperthyroidism, nephritis with deformity of the symphysis pubis, and influenza. The risk with cases of such type would be considerably higher and the chances of failure greater. The question of lessening the strain of labor has been the thought with some, and with all the factor of succeeding pregnancies has been of great moment, as practically all of them have been done for constitutional conditions, or other features which would render succeeding pregnancies a greater risk to the mother. In performing ligation of the tubes, it is usually necessary to deliver the fundus, hence this procedure makes some pain from traction on the broad ligaments. It is almost impossible to control this feature. Likewise no toilet of the peritoneum can be made without great pain to the patient. Too deep narcotization would obviate a part of these things but seems to offer a greater risk to the baby.

In preparation of patients, no enema or purgative is given. A dose of morphine sulphate gr. $\frac{1}{6}$, scopolamin hydrobromide gr. $\frac{1}{100}$, is given one hour before operation. At operation 0.5 per cent novo-

*Read at a meeting of the Obstetrical Society of Philadelphia, April 1, 1926.

caine solution is used by infiltration, endeavor being made to infiltrate the entire thickness of the abdominal wall before making incision.

The cases submitted are as follows:

CASE 1.—M. M., twenty-two years old, eight and one-half months pregnant. Chronic valvular endocarditis. Had been in bed for decompensation on three occasions before marriage, and has had "weak" spells through this pregnancy. Pelvic measurements slightly under normal, and baby not very large. A local section was performed to relieve her heart of the strain of labor and to ligate the tubes. Both mother and child recovered.

CASE 2.—J. J., thirty years old, pregnant at term, second pregnancy. First pregnancy transverse with prolapse of arm, delivery by version and extraction, secondary repair, prolonged stay in the hospital, development of pelvic abscess and recovery, moderate contraction of the pelvis. A section, in the interest of both mother and child, with ligation of the tubes was done. Mother and child recovered as in her first pregnancy, but the hospital stay in the second case was shortened to twelve days.

CASE 3.—K. R., twenty-nine years, eight and one-half months pregnant. Influenza, chronic pulmonary tuberculosis, scoliosis. Para iii, first and second children spontaneous. Section and ligation of tubes, with recovery of both mother and child.

CASE 4.—M. H., primipara, age twenty years. Cough, dyspnea, pregnancy of eight and one-half months, treated for heart condition for a number of years, and has been in a sanitarium for her "health." Diagnosis was pulmonary tuberculosis, chronic endocarditis; pregnancy. Operation, cesarean section, ligation of tubes.

CASE 5.—V. B., aged twenty-two years, primipara, shortness of breath, pain in region of the heart, fainting spells. Blood shows marked secondary anemia; urine, albumin, rbc. and a pure culture of colon bacillus; chest pulmonary tuberculosis. Pregnancy at seven months. Section with recovery of mother. The baby lived one hour. Diagnosis: nephritis, pyelitis, pulmonary tuberculosis.

CASE 6.—A. L., twenty-five years, para vii, diagnosis: pregnancy term, pulmonary tuberculosis, chronic endocarditis. Section, ligation of tubes. Recovery of mother and child.

CASE 7.—E. B., thirty-one years, para ii. Diagnosis: toxemia of pregnancy, pregnancy of eight months. The previous pregnancy was marked by toxemia, but not so severe as the present. Section with ligation of tubes, and recovery of mother and child.

CASE 8.—J. S., twenty-nine years, para vi. All deliveries very difficult. Chest aggravated during this pregnancy. Also development of what seems to be tuberculous enteritis. Patient had a previous suspension operation. Section at term with ligation of tubes. Mother and child recovered.

CASE 9.—J. S., forty-one years, para iv, youngest child nine years, complete repair including amputation of cervix five years ago. Cesarean advised if pregnancy ensued. Chronic interstitial nephritis with hypertension evident during this pregnancy. Delivered by section under local anesthesia with ligation of tubes. Recovery of both mother and child followed.

CONCLUSIONS

It would seem that the following conclusions might be drawn from the foregoing cases:

1. The strain of labor may be lessened without greatly increasing the risk to the patient, by performing narco local cesarean for certain constitutional conditions.
2. Narco local anesthesia is far safer than ether or any other general anesthetic in most of these conditions.
3. It is better to perform sterilization in selected cases at the time, thereby saving the patient the necessity of another operation, either for ligation of the tubes or a therapeutic abortion in order to save her life.

3025 FRANKFORD AVE.

(For discussion see page 260.)

THE FALLACY OF THE PRESENT TREATMENT OF THE POSTPARTURIENT BREAST*

BY WILLIAM W. VAN DOLSEN, M.D., PHILADELPHIA, PA.

(From the Obstetrical Service, St. Agnes Hospital)

FROM time to time, a form of treatment or a certain method will appear in medical literature and will be handed down from book to book on the subject to which it refers until its use becomes an established procedure seemingly beyond question. Such has been the case in the treatment of the nursing breast by the time-honored but fallacious method of washing with boric acid. Following the method established by general usage and current teaching, it was, in the past, our practice to order all breasts and babies' mouths on our service washed both before and after nursing with a saturated or four per cent solution of boric acid, and the nipples subsequently covered with a square of sterile gauze held in place by a properly adjusted binder. This has been our technic for a number of years and, although we felt that in doing as others were doing we had, to the best of our ability, safeguarded the interest of the nursing mothers under our care, we were annoyed to find that there would develop an occasional breast abscess. Furthermore, we were astonished to note that the private room case, with the entire time of a graduate nurse devoted to her needs, seemed to develop abscess of the breast more than did the patient in the ward who received only part of the time of a nurse in training. These observations caused us to carry out the following experiments:

First, we cultured the mouths of fifty nursing babies from three days to two weeks of age and found them to be almost entirely free of

*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

either streptococcus or staphylococcus, an organism which we found on thirty out of fifty cultured breasts. Next, to find if there was any antibody or bacteriophage in the babies' saliva, we collected in a sterile pipette one c.c. of saliva from the mouths of nursing children, and in this implanted pathogenic organisms collected from the breasts of nursing mothers. The organisms multiplied rapidly, showing that the saliva of a nursing child is a good medium for the growth of bacteria. Then, to determine the value of the boric acid treatment, we washed the nipples and breasts of twenty mothers with a saturated solution of boric acid and cultured them, using sterile broth as a medium. After thirty-six hours' growth we found practically no difference in the number of bacteria per field in the cases washed with boric acid solution and the cases cultured from the unwashed breasts. We next took ten c.c. of glucose bouillon and ten c.c. of boric acid solution, mixed them, and in the mixture placed the culture from an unwashed breast, with the result that, after thirty-six hours, there was a marked growth of bacteria. These procedures proved to our satisfaction that a breast washed with boric acid solution was not safeguarded to any decided degree.

Hypochlorite seems to hold out a just claim as an antiseptic safe for both mother and child. Experimenting in fifty cases with solutions of varying strengths, we have proved that a solution as low as one-tenth of one per cent will, if it is sopped on the breast with a square of sterile gauze for one minute, or, if the gauze be allowed to remain on the nipple for one minute, kill all surface bacteria. A culture of the breast thus treated showed no growth after thirty-six hours. Bacteria would not grow in a two c.c. mixture of hypochlorite and broth (hypochlorite one-tenth of one per cent). Therefore, we at once discontinued the use of boric acid solution and substituted hypochlorite solution one-tenth of one per cent. The result has been that in six months of continuous use we have had no cases of breast abscess develop while the patient was in the hospital; and we have seen no trace of irritation to either the skin of the breast or to the baby's mouth. We believe that by a conscientious use of hypochlorite solution as a skin antiseptic in nursing mothers the infection resulting from surface bacteria can be eradicated. It is hoped that a further trial will bear out the results thus far obtained. Of course, it is understood that as soon as a fissure occurs in a nipple, nursing is at once discontinued and the breast pumped until the fissure heals. To allow the mouth of the child to come into contact with a fissured breast is to invite an abscess.

We were greatly aided in our investigation by the care and laboratory technic of J. Atlee Dean who not only gave us his assistance but placed his laboratories and staff at our disposal.

(For discussion see page 264.)

NONSPECIFIC PROTEIN THERAPY IN GYNECOLOGY*

BY LEONARD AVERETT, M.D., PHILADELPHIA, PA.

(Gynecologist to St. Agnes Hospital, Gynecologist and Obstetrician to Northern Liberties Hospital, Associate Gynecologist and Obstetrician to Philadelphia General Hospital)

THIS method of therapy was at first based principally upon empiric grounds, as there existed neither specific nor scientific basis for its use. The criterion of the efficacy of a drug depends upon the results obtained; and the results of the nonspecific protein therapy in gynecologic infections have been so gratifying that its use became quite widespread, especially in Germany and later in the United States. The increased application of this principle of therapy also led to careful study of the subject and we have at present at our disposal a considerable number of statistical and experimental reports pertaining to this problem.

PREPARATIONS USED

1. Proteins; i.e., purified casein, caseosan, aolan, fat-free milk extracts.
2. Mixtures containing proteins; i.e., milk, lactogen, blood serum.
3. Products of protein splitting; i.e., purified proteoses, commercial peptones.
4. Bacterial vaccines when used in nonspecific infections.
5. Terpietin, a preparation of turpentine and olive oil. This produces a cold abscess, and the patient then absorbs the disintegrated products and derives the benefits of nonspecific protein therapy.

After bacterial vaccines for specific infections came into use, it was observed that any substance which was capable of inducing a "shock-reaction" in the patients would cause some beneficial therapeutic effect. Hence, there was really only a step from specific to nonspecific protein therapy.

Nonspecific protein therapy was first used in gynecology in the form of milk. In 1916 Schmidt and Saxl introduced intramuscular injections of milk in order to bring about a protein reaction; i.e., the febrile reaction with its concomitant phenomena.

Gellhorn was the first in this country to call attention to the value of milk injections in gynecologic infections. He said, "Protein substance introduced by subcutaneous, intramuscular or intravenous injections have the faculty of stimulating the cells to greater activity and of activating the protoplasm. All cells of the body feel this rejuvenating influence but none more so than those cells which have been weakened or paralyzed by infection."

*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

THEORIES

There are various theories as to the mechanism whereby a good effect is brought about by nonspecific protein therapy. Weischgardt maintains that the therapeutic effect is a plasma activation, namely, that with the injection the organism is stimulated, and that the resulting reaction represents a summation of all the forces of resistance with which the body is equipped. The leucocytes become more active, their number is increased by stimulation of production in the bone marrow; antibodies, therefore, fixed to the cell are shed, enzymes are mobilized, and glands of internal secretion stimulated. In addition to this active phase, there is also developed a passive form of resistance, namely, the increased tolerance to intoxication. This stimulates the phenomena observed after anaphylactic shock. Von den Velden, Luithlen and Starkenstein have all observed the decided changes that occur in the permeability of the capillaries after nonspecific injections. The conclusion may be reached, says Peterson, that the various nonspecific agents injected are marked by permeability in the cell membranes. This implies that there is an increase in the lymph flow, the irritability of the nerve cell is increased, and there is a freer exchange between blood plasma and cell content. Sensitized cells give up their antibodies, enzymes are mobilized, thrombokinase and fibrinogen increased, and the blood-sugar level altered.

The period of increased cellular permeability corresponds with the clinical period of increased general malaise and the local aggravation of the inflammatory process. This phase is followed by one of diminished permeability. It is in this stage that we find the cellular resistance to intoxication increased, the threshold for nerve stimuli raised, and evidences of intoxication and inflammation subsiding, while the patient experiences a general improvement.

Clinically, what do we observe following the injection of a nonspecific protein substance?

Most writers on this subject claim that a shock reaction with a high temperature is essential in order to obtain a beneficial result. I have obtained equally as good results without any febrile reaction, by using sterile milk in the form of aolan lactogen or milk of a low bacterial count as certified milk. By doing so you save the patient from a great deal of discomfort and make it possible to treat the subacute cases in your office. The temperature soon reaches and stays normal.

Leucorrhea is increased at first and soon begins to lose its purulent character and lessens in quantity. Many of my cases, whose smears were positive for gonococci, became negative. On vaginal examination, one finds the pelvic organs that were matted together, very tender, and could not be outlined, now less tender the exudate being absorbed, the uterus palpable, adnexa smaller, or entirely normal.

The blood changes that follow injections of nonspecific proteins, have always been described as a leucocytosis with an increase of the polymorphonuclear leucocytes. My observation differs. I have found a leucopenia with a decrease in the polymorphonuclear leucocyte but an increase in the lymphocytes, chiefly the small lymphocytes. Whether this is due to the fact that I used sterile milk and did not produce a febrile reaction in the cases in which I had blood studies made I am not prepared to say.

The local reaction may consist of a painful induration at the site of the injection and an increase of the pelvic or abdominal discomfort. Usually, however, marked and immediate relief from pain follows within twenty-four hours after the first injection. The patient develops a sense of euphoria or well-being which is quite remarkable, and the sedatives can often then be dispensed with.

R. M. Rawls says that the great relief of pain in adnexal inflammation was so constant that his associate suggested its use as a differential sign in suspected ectopic gestation.

To summarize the effect of nonspecific protein therapy; there is an immediate negative phase with increased permeability of capillaries followed by a positive phase with decreased capillary permeability. The increased permeability causes an increased flow of lymph,—especially of the liver and skin which washes into the blood stream a large variety of products of cell metabolism.

Brown and Greenthal observed further blood changes. In the later stage, there is an increased number of young and atypical red blood cells and an increase in the number of blood platelets. The fibrinogen, thrombokinas and globulin are increased. There is a slight rise in the blood-sugar curve at the height of the reaction following the protein injection. There is a moderate rise in the urea and total non-protein nitrogen of the blood. The proteolytic ferments of the blood are increased. The antibodies of the blood are increased. Some of these findings come from the Johns Hopkins University.

Is there any danger in the use of nonspecific protein therapy?

R. M. Rawls says, "Even with intramuscular injections of milk it is well to keep in mind the contraindications to the injection of the more active substances. Care must be observed to obtain a history of hypersensitiveness on the part of the patient,—serum sickness, asthma, urticaria, angioneurotic edema, epilepsy, alcoholism, pregnancy, various cardiac lesions, and diabetes, in which conditions the use of non-specific protein therapy is contraindicated."

My experience with the use of bacteria-free milk not producing a shock reaction makes for no contraindication and its use is free from danger in all cases.

Sensitization to repeated intramuscular injections of milk seems to be rare, although it is being used quite frequently. Hecht made intracutaneous injections of milk in patients injected previously with milk and also in noninjected patients. There was no difference in the skin response, nor was he able to demonstrate milk antibodies.

Experience has shown that when the dosage of the foreign protein is carefully determined it is practically free from danger. At the Cook County Hospital there were given over 2,000 intravenous injections of the typhoid vaccine in the treatment of various acute infections without any serious consequences.

I have treated 32 cases of pelvic inflammation with nonspecific proteins; 24 acute and subacute, and eight chronic cases. I failed to obtain any beneficial result in the chronic cases and am convinced that this form of treatment is useless in cases of long standing where dense adhesions have formed. Of the 24 cases, 18 were due to gonococcal infection. This was demonstrated either by positive smears, history of acute gonorrhea in the husband or by the character of the infection.

The remaining six were postabortal and puerperal, which are mostly due to staphylococci and streptococci. The quickest and best results were obtained in those due to the gonococci. In the first six cases, I used plain milk boiled for three minutes, and obtained a violent reaction in six to eight hours, severe chills followed by high fever and finally profuse sweats. The reactions were so severe that patients feared taking the injections and I admit myself being rather nervous about giving them on account of the severe reactions and discontinued giving them for a while.

While abroad in 1922 and 1923, I observed the use of sterile milk in pelvic inflammation and found they obtained excellent results without causing a shock reaction. Since my return I have treated acute and subacute pelvic inflammation by this method with good results and no hazard to the patient.

My method of treatment consists of an intramuscular injection every other day of 10 c.c. of certified milk skimmed and boiled for five minutes on a water-bath, or the same quantity of aolan. Copious hot vaginal douches twice daily also help in the absorption of the exudate. Nourishing food and hemotonics are essential to overcome any hemolysis so often seen in these infections. The number of injections varies from five to fifteen or an average of about nine.

CONCLUSIONS

Nonspecific proteins have a definite and valuable place as therapeutic agents in the treatment of gynecologic infections. Their judicious use will replace surgical intervention in some cases and will

thereby not deprive women of the sex organs, and enable them to continue menstrual and reproductive functions.

Following the use of nonspecific proteins there develops a leucopenia, with a decrease in the polymorphonuclear leucocytes and a relative lymphocytosis. This, therefore, supports the theory that the beneficial effect derived from this method of treatment is an increased lymphogenesis and lymph flow to the region of infection.

A febrile reaction with its train of disagreeable symptoms is not considered essential in the successful use of nonspecific protein therapy as was heretofore thought necessary. A fat-free milk of low bacterial count will give good results without a reaction and with very little discomfort to the patient.

In my experience, the use of this therapeutic agent yields the best results in the acute and subacute pelvic infections; i.e., before dense adhesions have had time to develop.

The immediate effect of the injection of nonspecific proteins is the disappearance of pain and the development of a sense of well-being.

REFERENCES

- Clark, A. J.: Brit. Med. Jour., Feb. 24, 1923, p. 315. Miller, J. L.: Jour. Am. Med. Assn., Jan. 29, 1921, lxxvi, No. 5. Peterson, W. F.: Jour. Am. Med. Assn., January, 1921, lxxvi, 313. Greenthal and Brown: Arch. Inter. Med., 1922, xxx, Pt. 2, pp. 99, 105. Von Jaschke, R. T.: Therapeut. Halbmonatshefte—1, September, 1921, Hf. 17. Vochl, J.: Arch. f. Gynäk., 1921, exiv, 501. Rawls, R. M.: New York State Jour. of Med., Dec. 15, 1925, xxv.

HYDRAMNIOS IN UNIOVULAR TWINS; WITH THE REPORT OF A CASE*

BY JAMES F. CARRELL, M.D., PHILADELPHIA, PA.

(From the Department of Obstetrics, Jefferson Medical College)

HYDRAMNIOS, or polyhydramnios, an excess amount of amniotic fluid in pregnancy is rather an infrequent complication in an acute form. Randall, in reporting from the Mayo clinic, states that it occurs in the chronic form approximately once in 150 pregnancies. Chambrelent, writing in 1914, asserted that acute hydramnios was relatively rare and that he could find only 50 cases recorded in the French literature. Burstal, writing in 1910, recorded 13,967 pregnancies with 133 instances of hydramnios; no mention was made of the acute form.

When the quantity exceeds five pints (1½ liters) it is sufficient to upset the normal relation in size of the uterine cavity to the fetus. Very large quantities of fluid have been reported.

The origin of the amniotic fluid is conjectural. It is generally conceded to be fetal and its over-production may also be fetal, since it usually occurs in healthy women.

In hydramnios, certain fetal maladies are very common, as hydrocephalus, anencephaly, spina bifida, harelip, and talipes. It frequently occurs in uniovular (homologous) twin pregnancy, affecting only one amniotic sac. When associated with uniovular twins, there is no doubt that the fetal urine has to do with the overproduction of fluid. The twins, as a rule, differ markedly in size. The heart and kidneys of the larger twin are greatly hypertrophied; the hydramnios affects the amniotic sac of the larger twin, that of the smaller twin containing a normal or a diminished quantity of fluid. The umbilical vessels of uniovular twins always anastomose freely in the single placenta, and if, for some reason, one twin obtains more than its fair share of the circulating blood, its heart and kidneys hypertrophy, with the result that the secretion of urine is greatly increased and hydramnios follows.

The characteristics of the fluid in hydramnios do not vary from the normal. Hydramnios is more common in multiparae, but this may be only relative, not actual. Syphilis seems to play only a coincidental part in hydramnios. Floris, in his collection of 224 cases, reports the occurrence of five syphilitic infants; three of these children lived.

The chronic form is very much more common. This may, and prob-

*Read at a meeting of the Philadelphia Obstetrical Society, May 6, 1926.

ably does, begin early in gestation, going unnoticed for a time, not becoming recognized clinically until the fourth or fifth month of pregnancy. Planchu believes there are two forms of acute hydramnios, one which appears during the early months of gestation, and one which develops in the later months of normal gestation, or supervenes on hitherto chronic hydramnios. He (Planchu) thinks the very early cases are twin pregnancies and that the early cases abort.

In two per cent of the cases of hydramnios, it assumes the acute form, there is rapid abdominal enlargement, and in severe cases it may be seen to enlarge daily. It is in this type that symptoms are most marked.

When the increase of fluid is gradual, the heart and lungs are more apt to adapt themselves to the increased abdominal pressure. Although the abdominal enlargement is often enormous in this condition, the patient suffers relatively little discomfort. The only distressing conditions are some embarrassment of respiration and heart action, which are most marked in the recumbent position, the patient resting best propped up in bed. There may be slight pain and anesthesia of the lower extremities. Edema of the legs may or may not be present. There is no special tendency to albuminuria.

The abdominal enlargement is general, the transverse diameter is increased and the whole abdomen suggests the presence of a spherical tumor, rather than the normal ovoid uterus. The subcostal angle is widened and all available abdominal space seems to be filled by the encysted fluid mass. There is a fluid thrill felt over all parts of the abdominal surface. The lower uterine segment is wide and resistant. The whole uterus imparts an evenly resistant sensation to the palpating hands.

As a rule, no fetal parts can be felt. If one is fortunate enough, however, to touch a fetal structure, it is by deep palpation only and the sensation is that of a floating body in a large quantity of fluid.

Fetal movements and fetal heart sounds are rarely elicited. Because of the great distention of the lower uterine segment, the cervix is elevated. Increased intrauterine pressure and stretching of the lower uterine segment causes a varying degree of cervical obliteration and dilatation. By vaginal examination, with the patient's shoulders well elevated, floating fetal parts may be detected through the thin lower uterine segment or through the dilated cervix.

Pregnancy, with ovarian cyst, with ascites, with overdistention of the bladder, or with twins, has occasionally been mistaken for hydramnios. If a careful history is taken, and a careful investigation made, a differential diagnosis should not be difficult. It must be remembered that the roentgenologist may be able to demonstrate even a very young fetus in a great quantity of fluid.

Farranridge, of Sydney, Australia, reports a case of acute hydramnios—previously diagnosed as acute appendicitis complicating pregnancy. A woman of twenty-five, para ii, and about six months pregnant, was awakened at night with severe generalized abdominal pain, immediately followed by vomiting, subnormal temperature and pulse of 140. Although the history revealed that she was six months pregnant, the abdomen was greatly distended and larger than at full term. It had doubled in size during the preceding twelve hours. The rigid abdominal wall greatly masked the condition lying beneath. Rigidity and tenderness were most marked in the right lumbar and iliac regions. The fetus could not be felt by abdominal palpation and fetal heart sounds could not be heard. There were no uterine contractions; however, the cervix was completely dilated, the membranes were bulging, and a small fetal head could be ballotted. He (Farranridge) made a diagnosis of acute hydramnios and punctured the membranes, freeing a large amount of fluid and a small child. Then to his surprise, there was another amniotic sac, overfilled with fluid and containing another child. Well-formed, living twin boys, one $2\frac{1}{2}$ and the other $2\frac{3}{4}$ pounds, with one placenta, were extracted. All symptoms immediately disappeared after the contents of the uterus were evacuated.

If there is spontaneous rupture of the membranes, or if the fluid is permitted to escape rapidly, the cord may be swept out with the gush of fluid. Because of the overdistention of the uterus and inability of the lower uterine segment to grip the presenting part, abnormal presentation must be anticipated. The overstretched uterus contracts poorly and at times it is necessary to deliver the placenta manually and to prevent postpartum hemorrhage by uterine packing.

Through the courtesy of Doctor P. Brooke Bland, I am privileged to report the following case:

Mrs. A. S., aged twenty-five. No history of plural pregnancy in the family. Had no severe illnesses, operations, or injuries during her entire life. Menstruation normal.

The patient was married at the age of nineteen, and the first child was born when she was twenty-one. Of four pregnancies, three terminated spontaneously at full term, with normal living children. All recoveries were normal. The last normal period occurred on Aug. 1, 1925. The patient had been entirely free from nausea and vomiting, and had no unusual symptoms at all, excepting amenorrhea and slight breast changes during the first three months. Fetal movements were first felt about Dec. 10. Up to this time the abdominal enlargement was scarcely noticeable.

From the second to the fourth week in December, the abdomen enlarged from a slight prominence below the navel to a distention greater than had ever been present in her previous pregnancies even at full term. As time advanced, the distention seemed to grow more rapidly, and on Dec. 24 the entire abdomen became tender and painful, the pain being most marked in the flanks, and much greater in the right flank than in the left. There was no vomiting.

Previous frequent micturition, which had been present both by day and by night, had entirely disappeared, and dyspnea had progressively increased to the extent that it was almost impossible to lie flat. There was no edema of the lower extremities, in fact there seemed to be no circulatory disturbance of any kind. Fetal movement was felt early in December, but after the abdominal distention became severe, this sensation completely disappeared.

This patient consulted a neighborhood doctor late in December and was told she would soon start in labor.

On Jan. 3, the generalized abdominal pain, which had previously been constant, became intermittent in character, and an out-patient student of the Jefferson Medical College was called in to deliver her. What seemed to be labor did not progress. The size of the abdomen, however, was noted to grow daily. On Jan. 5 a consultation was called, and I found a young woman, small in stature, propped high in bed in great discomfort. The face showed signs of suffering from loss of sleep. The teeth and gums were in very poor condition. All of the signs of well advanced pregnancy were present in the breasts. Respiration was rapid; the lungs were negative; the abdomen showed a massive ovoid enlargement; the abdominal wall was tense and the skin glistening, and the abdominal veins were distended. A fluid wave could be easily felt over all parts of the abdomen. The entire abdomen was slightly tender, and the outline of the uterus could not be felt. Fetal parts were not palpated and the fetal heart sounds were not heard.

Vaginal examination showed a cervix situated high in the pelvis, dilated about 3 cm. with a small fetal head presenting. The membranes were intact, but not very tense, and there seemed to be very little fluid present, in fact the fluid was so scant that ballottement could not be elicited. The patient was immediately admitted to the hospital.

An ovarian cyst, complicating pregnancy, which had for some reason taken on very rapid growth, was thought of and was later disproved by an x-ray examination.

The pelvic measurements were well within normal limits. The urine was amber, normal except for a faint trace of albumin and a moderate amount of indican. Blood examination showed the hemoglobin 66 per cent; 4,200,000 erythrocytes; 5,400 leucocytes, and a color index of 0.78.

The blood pressure was 120/80.

X-ray report submitted by Doctor W. F. Manges was as follows: "We can only see the skeletal outline of one fetus on the right side. It is fairly high. The uterus seems to be distended considerably. On the anteroposterior view the density is so great as to obliterate the outline of the fetus. We would naturally suspect polyhydramnios as the cause."

During the short stay of this patient in the hospital, before operative interference was instituted, there was a daily noticeable enlargement of the abdomen.

On Jan. 9, Doctor Bland operated upon the patient under ether. The cervix was found to be almost completely dilated. The membranes were intact and bulging, and a small fetal head was presenting. The membranes were ruptured and a small amount of amniotic fluid was expelled. A small, well-formed, and living female child was extracted. A large, tense sac presented. This was carefully punctured, allowed to drain slowly, and 8500 c.c. of amniotic fluid were collected. A second, well-formed, living female child was extracted. A single placenta was then removed manually and the uterine cavity was packed with plain gauze. An ampule of ergot and of pituitrin were then given hypodermically, a tight abdominal binder applied, and the patient returned to the ward in very good condition. After the uterus was emptied, it contracted firmly and there was very little bleeding. The patient recovered without any complications.

I recently examined this woman and found her in excellent health. The uterus was normal in size and in good position. Involution of all abdominal and pelvic structures was complete.

COMMENT

Floris collected 224 cases of hydramnios which occurred in Vienna between 1910 and 1921; there were 32 pairs of twins, no triplets, 49 stillborn infants, 24 who died soon after delivery, 182 born alive, 95 premature infants and 30 monstrosities.

Randall reports a case of homologous triplets with polyhydramnios in a woman of twenty-three, para ii. This patient, it is stated, had a negative Wassermann.

Wetterwald, in discussing the literature on the complications of pregnancy with ovarian cyst, states that in the majority of the cases hydramnios was mistaken for the true condition.

Floris, writing in 1923, traced to that date, 65 of 236 children born with hydramnios. Only 14 per cent are known to have died. The physical and mental development of the others has been excellent, averaging well with other children.

While Krahula, writing about the same time, reports on 72 cases collected at Bonn and 219 cases collected from the literature, in this series only 3.78 per cent of the children survived and only 1.03 per cent of the total number were normal.

Krahula, writing at an earlier date, in his reports from the Bonn clinic and cases collected between 1877 and 1910, found that 103 of 291 infants were born dead; only 11 (3.78 per cent) lived, and only 3 (1.3 per cent) were healthy. The maternal mortality was not mentioned.

It is found there is a wide diversity of opinion regarding this feature of the condition.

Henry, of Paris, reports a case in 1925, in which the cord was coiled eight times, with complicating hydramnios. He states that the child was delivered normally and alive.

Balard records a case of hydramnios which seems to have occurred after the death of the fetus.

During the past twelve months there have been 997 deliveries in the Jefferson Maternity Hospital, including the patients delivered on the outside, but supervised by the dispensary staff. In this number, there have been two cases of hydramnios, or one in 498.5 cases. The children were all well formed, but premature. The mothers had a negative blood Wassermann. In one case the babies were living, but not viable; in the other, the baby was slightly macerated.

In a review of the literature as far back as 1900, very little is said of the treatment for this condition. It would seem that something might be done to carry these women along by draining off the amniotic fluid gradually by uterine tapping (as recently suggested by a continental observer) until the child reaches such an age that it might live independently of the mother.

REFERENCES

- Randall, L. M.: AM. JOUR. OBST. AND GYNEC., December, 1924, viii, 766-770. Chambrelent, J.: Bull. Soc. d'Obst. et de Gynee. de Par., 1914, iii, 432. Burstal, E.: Practitioner, London, 1910, lxxxv, 112. Floris, M.: Monatschr. f. Geb. u. Gynäk., 1923, lxii, 55. Farranridge, T.: Med. Jour. of Australia, Sydney, Feb. 16, 1924, i, 161, 162. Wetterwald, M.: Schweiz. med. Wehnschr., March 12, 1925, lv, 225. Krahula, G.: Abst. Jour. Am. Med. Assn., Dec. 17, 1921, lxxvii, 2009. Pocch, E.: Monatschr. f. Geburtsh. u. Gynäk., July, 1923, lxiii, 203. Balard, P.: Rev. Mens. de Gynee. et d'Obst., May, 1919, xiv, 187. Henry, J. R.: Revue Frane. de Gynee. et d'Obstet., March 10, 1925, xx, 169.

332 SOUTH 21ST STREET.

(For discussion see page 262.)

PERITONEAL ACTINOMYCOSIS, WITH THE REPORT OF A CASE*

BY THOMAS H. CHERRY, M.D., F.A.C.S., NEW YORK CITY

ACTINOMYCOSIS is a chronic inflammatory condition produced by the invasion of the human tissues with the actinomyces or ray fungus. The gastrointestinal tract becomes the host of this parasite through contamination with vegetable matter, such as grass, straw or grain, and may there either produce an infection or the organism penetrates the gut wall through an abrasion to infect adjacent abdominal structures. In the transmission of this infection the lymphatics play little or no part, as extension takes place by continuity. Metastasis to distant organs occurs through the medium of the blood stream. Infection of the tissues by the ray fungus results in an inflammatory mass that is characterized by slow growth and the production of new connective tissue. During the course of the disease, areas of necrosis occur throughout the mass, forming multiple abscesses of various sizes that may rupture into hollow viscera or upon the surface of the skin, causing fistulas or sinuses. The contents of the abscesses consist of necrotic material that shows the presence of numerous small yellow seed-like particles popularly named "sulphur granules"; the recognition of these bodies immediately suggests the true nature of the infection. These granules can often be seen in pus from discharging sinuses which, upon staining, show the organism.

Doubt and confusion have frequently arisen regarding the source of the actinomycotic infection, Wolff and Israel being the proponents of the older theory and Bostroem expounding a newer one. To aid in clarifying the situation concerning the types of organisms that may infect man and cattle, Sanford of the Mayo Clinic says, "It is best to follow the recommendations of the Committee on Nomenclature, and to classify as belonging to the genus actinomyces, those organisms growing with much branching mycelia which may break up into segments that function as conidia, sometimes parasitic, with clubbed ends and radiating threads in the lesions of the animal body. The organism is nonmotile and certain species are anaerobic. It must also be said that some of the actinomyces are acid-fast while others are not. When an organism that can be so classified in this genus is found in the tissue or discharges, the disease must be called actinomycosis."

The same author in an exhaustive search of the literature in the United States has collected 678 cases of human actinomycosis. He

*Read at a meeting of the Section of Obstetrics and Gynecology of the New York Academy of Medicine, April 2, 1926.

states that the infection has attacked every part of the body except the esophagus and lachrymal duct. The more frequent sites are the head and neck, the abdomen and thorax, named in order of their frequency.

Clinically, abdominal actinomycosis is readily mistaken for other slow growing tumefactions. This mistake is frequently made even when the mass is palpated and inspected through an abdominal incision, unless, through a rupture of an abscess cavity the characteristic "sulphur granules" are noticed. The inflammatory mass is usually diagnosed as neoplastic in origin. The abdominal or peritoneal form of the disease is caused by the penetration of the ray fungus through the intestinal wall. The peritoneum immediately reacts by the formation of adhesions that later become very dense, matting together the intestinal coils to adjacent structures. The organism, in spite of dense lesions acting as barriers, continues to burrow and to produce by continuity further inflammatory tissue. Necrotic areas may occur early in the disease but may not give evidence of their formation until late.

This type of actinomycosis has a mortality rate of 70 per cent. Operative death frequently depends upon injuries to important structures in attempting the removal of the growth. Owing to the dense adhesions encountered, and the burrowing tendencies of the mycelia, gut wall is easily perforated, blood vessels injured, and death occurs from shock, hemorrhage and peritonitis. Remote deaths are due to cachexia, caused by recurrences and extension to the liver and thorax, following incomplete excision of the primary mass. This is well illustrated in Hellwig's collected series of 30 operated cases of adnexal actinomycosis, 21 of whom died at intervals varying from three months to six years following the primary operation.

The following is a case report occurring in the Gynecological Division at the Harlem Hospital:

Patient V., colored, unmarried, was admitted to the hospital May 3, 1925, complaining for the past two months of abdominal pain and leucorrheal discharge. Her previous history had no bearing upon the abdominal condition. The menstrual history was normal. Upon examination she presented a tender tumor mass situated in the suprapubic region that was fixed to the abdominal wall and pelvic viscera. The size was estimated to be 10x12 cm. As there was a moderate degree of endocervicitis, a diagnosis of tuboovarian disease of probable gonorrheal origin was made. There was no fever. The leucocyte count and urine were normal. Cervical smears showed a moderate number of pus cells, but no gonococci.

The patient was placed upon diathermy treatments for a week without improvement, when an operative procedure was decided upon.

Operation.—When the abdominal wall was incised through the rectus muscle, it was seen that the mass involved the parietal peritoneum immediately under the incision. It was clearly circumscribed, extremely dense in consistency and seemed to be connected with the dome of the bladder. The estimated measurements were 12 cm.

long, 10 cm. wide and 3 cm. in thickness. The peritoneum was incised at the upper angle of the wound to one side of the mass, and the abdominal cavity entered. Many dense adhesions were encountered. Upon their separation it was seen that a loop of the sigmoid was firmly fixed to the tumor mass. This was freed with difficulty by sharp dissection and, in order to prevent injury to the gut wall, it was necessary to leave a portion of the tumor mass attached to it. Further inspection of the abdominopelvic cavity revealed other adhesions to the pelvic viscera, but the uterus and adnexa were not involved in the inflammatory process. The mass now was seen to be an invasion of the parietal peritoneum, and the transversalis fascia apparently attached to and involving the dome of the bladder. It seemed to be neoplastic, rather than inflammatory in origin. No yellow areas were seen suggestive of abscess cavities. Partial excision of this mass was done more for diagnostic than therapeutic purposes. This procedure was considered more conservative than to attempt a complete excision with resection of the bladder, especially as the diagnosis

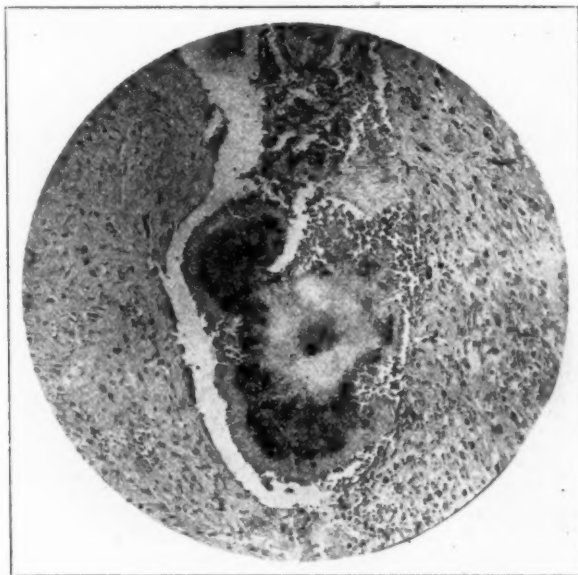


Fig. 1.—Showing the ray fungus with the mycelia inbedded in a zone of tissue consisting of fibroblasts, connective tissue cells, and round-celled infiltration.

was doubtful. The abraded surfaces of the gut were peritonealized and the abdominal wound closed without drainage.

Pathologic findings were as follows: The gross specimen, on section, was composed of fibrous tissue and fat. Microscopically the sections showed granulation tissue composed of fibroblasts in which small abscesses were found that contained numerous eosinophil leucocytes, polynuclear leucocytes, occasional plasma cells, and only a few large cells with foamy cytoplasm. In this granulation tissue there were bacterial colonies which, in gram stain, were composed of threads that stain gram-positive. Diagnosis: Actinomyces.

The postoperative course was uneventful except that on the fifth day there began a gradual extension to all the pelvic structures of what remained of the original growth. Masses appeared under the abdominal incision larger than before operation, and the pelvic cavity became completely filled with what seemed to be a hard exudate. No excessive rise of temperature occurred. On the tenth day the superficial

abdominal wound broke down in two places and discharged pus for a while, but gradually healed. The patient was placed upon increasing doses of potassium iodide, according to improved therapeutic measures, and the abdominopelvic masses grew smaller and finally completely disappeared. Cystoscopic examination revealed a normal bladder. The patient was discharged from the hospital on June 27, 1925, in an improved condition and apparently free from the disease.

Follow-up examination on July 25, 1925, showed an abdominal wound entirely healed; no sinuses were present and no abdominal or pelvic masses felt. The uterus and adnexa were normal.

Communication by letter from the patient in October, 1925, reported the condition satisfactory.

Communication April 15, 1926, from the mother of the patient stated that the abdominal wound intermittently broke down and discharged pus, then healed for a period of time.

The patient has been advised by letter to take potassium iodide in large doses, and to have roentgen ray treatment as recommended by Bragden.

Further surgical procedures of a more radical nature have been advised if the conservative treatment recommended does not result in the elimination of the disease.

Comment.—This case is reported: (1) On account of the unusual site of the lesion in the abdominal wall, simulating an intraabdominal condition. (2) Inoculation of the suprapubic area no doubt originated from the adherent loop of gut without itself showing any gross lesion. (3) The surprising feature that partial removal of the infected focus would produce complete disappearance of the gross pathology.

REFERENCES

- (1) *Bragden, Jas. C.*: Jour. Lab. and Clin. Med., 1922, viii, 180. (2) *Sanford, Arthur B.*: Jour. Am. Med. Assn., 1923, lxxxi, 665. (3) *Helwig, Ferdinand C.*: Surg., Gynec. and Obstet., 1925, xl, 502.

580 PARK AVENUE.

THE RELIABILITY OF THE WASSERMANN REACTION IN PREGNANCY

A REPORT ON FIVE HUNDRED CASES

BY J. R. McCORD, M.D., ATLANTA, GA.

(From the Department of Obstetrics, Emory University School of Medicine)

IN AN attempt to determine just how variable the Wassermann reaction is during pregnancy, the test was repeated on 500 pregnant negro women.

The laboratory work was done by the pathologic department of Emory University; the sheep-cell system was used. Only two persons made the tests, one of whom made over 90 per cent of them.

The first test was made at the time of the initial visit to the prenatal clinic. The duration of pregnancy at the time this was done was variable. The blood for the second test was taken at the time the patient was admitted to the hospital; in most of the cases, during the first stage of labor. For obvious reasons some of these second tests were made during the puerperium.

The reactions on the 500 women agreed in 87 per cent of the cases. There were thirty-nine cases in which the clinic Wassermanns were positive and the labor Wassermanns were negative. Of these, thirty-one cases had had antisyphilitic treatment. If we are allowed to deduct these cases, our reactions agreed in 93 per cent.

The clinic reaction was negative and the labor one positive twenty-six times. The Wassermann remained positive in thirty-five cases that had treatment. In sixteen, the treatment was slight, in nine fair and in ten good.

There were only sixteen cases in which both the maternal and cord Wassermanns were positive.

In eleven cases, the reactions had agreed but the mothers were discharged undelivered. Upon readmittance, the reactions again agreed in ten of the eleven cases.

61 FORREST AVENUE.

CASE REPORT

REPORT OF BILATERAL DERMOID CYSTS OF THE OVARIES IN A YOUNG GIRL

BY J. P. McDOWELL, M.D., ST. CLOUD, MINN.

Patient, white, age fifteen, American born, student, single, first seen by family physician Feb. 18, 1926. General condition: well nourished, strong, muscular, heavy boned type, bordering on the masculine. Previous illness, pertussis, varicella, rubella, tonsillitis and influenza, the latter in 1919. Had tonsillectomy in 1924. Menstruation began at fourteen, 28 day period, lasting three or four days, with no pain and a light flow. Parents and brothers and sisters living and well. Denied all venereal exposures or pregnancy.

Began present complaint Feb. 18, 1926, with pain in lower right quadrant, no nausea or vomiting. Pain lasted till Feb. 20. Felt well for two days except for loss of appetite. On Feb. 22 ate some toast and a few hours later the pain returned and continued, gradually becoming worse, accompanied by nausea and vomiting. Bowels had been regular till Feb. 23.

On Feb. 24 was taken to hospital where I first saw her.

Examination.—Abdomen, contour normal, except for an elevation projecting from McBurney's point into lower right angle, right rectus rigid. Palpation elicits pain in lower right quadrant, with extreme tenderness over McBurney's point. Pelvic examination neither made by rectum nor vagina. Leucocytes 7,800, temp. 97.6°, pulse 70.

Operation.—Right rectus incision made and the appendix found to be adherent at the distal end which dipped into the pelvis. There were many adhesions of the small bowels to the pelvic organs which hid them from view. The appendix was loosened, amputated and the stump invaginated into the cecum.

On examining the pelvis a hard tumor $3\frac{1}{2}$ inches in diameter was found behind the right fallopian tube, and a similar tumor $2\frac{1}{2}$ inches in diameter was found behind the left tube, and both proved to be ovarian. An attempt was made to shell them out and leave some of the ovarian tissue, but this was impossible, and the whole mass had to be removed in each case.

On opening the appendix it was found that the outside was gangrenous, but the mucosa appeared quite normal macroscopically, indicating that the infection had attacked from without. The tumors contained hair, skin, fat, teeth, and a quantity of greasy substance.

The tubes were red and swollen, but were left in situ. Patient made an uneventful recovery. Now four months after operation she has shown no indications of menstruating, nor untoward symptoms from loss of ovarian secretion.

Cases of bilateral dermoid cysts of the ovary in young girls are rare and I have been able to find only two cases younger than this one in the literature.

ST. MARYS BLDG.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D.

MATERNITY WORK IN THE COLONY OF HONGKONG

BY R. E. TOTTENHAM, M.D., D.P.H., F.R.C.P.I., HONGKONG, CHINA

*(Professor of Obstetrics and Gynecology, Hongkong University,
Late Assistant Master, Rotunda Hospital)*

WHEN asked to write an article dealing with conditions surrounding maternity and maternal welfare movements here, it was added "if any such exist." Now as I am not quite sure how to answer this latter remark, I will content myself with trying to describe what we are doing, which I am afraid must seem very insignificant compared with American or European standards. But I would ask that it should be remembered that we are dealing with a people, the masses of whom are uneducated and who do not take to new ideas kindly. Not only this but we are competing against those who practice Chinese native medicine and since they cannot profit by the introduction of modern methods, must of necessity be opposed to us. I do not wish to disparage Chinese medicine in any way. I am sure there is very much to be learned from it, and that it would repay a thorough investigation; but at the same time I cannot believe that its universal practice would be attended with as low a mortality rate as that of modern medicine.

With regard to China proper I have no information, but I doubt if there is any maternal welfare work worth considering outside the larger cities, except what the missionary enterprise may be responsible for.

Hospital development in the Colony is greatly hindered by lack of money; building sites are dear, for land is extremely valuable. There are three organizations which interest themselves in midwifery and the training of midwives.

1. The Chinese-controlled maternity hospitals, namely the Tsan Yuk and the Wanchai Hospitals, the maternity departments of the Tung Wah and the Kwong Wah Hospitals, the latter two being general hospitals.

2. The Alice Memorial Hospital, which is under missionary supervision.

3. The Government Civil Hospital.

The Tsan Yuk Hospital is devoted entirely to maternity and gynecologic cases, and the maternity work here, as in the case of the other Chinese-controlled hospitals, is under the supervision of Dr. Hickling, to whom I am indebted for much of my information, and for facilities for working in the hospital.

The building was opened about three years ago; the ground floor contains an out-patient dispensary, a nurses' dining room, and an isolation ward for such cases as typhoid or dysentery, where it is desirable to have the patients at some distance from the maternity wards.

On Friday mornings there is an infant welfare dispensary, and during the last year 341 infants were brought up, paying a total of 2366 visits; all of these infants had been born in the hospital.

On Saturday mornings there is a general women's dispensary. We have so far regarded it as undesirable, if not impossible, to divide our dispensaries up into gynecologic and antenatal; patients will not readily appreciate the difference and, in the present state of education of the coolie classes, practically no antenatal cases come up at all; indeed the average woman is inclined to regard any attention during pregnancy as entirely superfluous and in my department I am very glad if I can persuade a woman to remain in the hospital for four days after her child is born. As a whole the Chinese are not yet believers in so-called "Western Methods" and often only come to the hospital as a last resource.

There are probably not more than three men doing major gynecologic surgery in the public hospitals and yet, considering the large population, there are relatively few operations performed by any of them. If all the patients recommended for operations from the public dispensaries sought admission, my staff would have to be doubled or trebled.

The first floor of this hospital is devoted to midwifery. There are two large wards, some private wards, making a total of 25 beds, and also a nicely fitted-out labor ward. Last year the total confinements reached 608.

The second floor is a replica of the first. It was opened for gynecology in October, 1925, and contains space for 25 beds. The theatre situated over the labor ward only recently has been fitted out. Since October last when Dr. Hickling kindly placed this floor at my disposal we have operated on about 40 patients between us, but it is really only in the last few weeks that the Chinese public is beginning to know of the work done.

The third floor is devoted to the nurses' quarters.

The entire nursing staff is Chinese, including the matron. The hospital is also a training school for midwives. Before the opening of the gynecologic wards, the period of training was two years, during which time the pupil midwife was resident in the hospital and performed ordinary nursing duties under the supervision of the matron and trained nurses. Since the opening of the gynecologic wards the period of training has been extended by one year, so that the pupils will have a year's experience in the nursing of operation cases and theatre routine.

At the end of their three years they will obtain a certificate from the hospital if their conduct has been satisfactory, and will be eligible to sit for the Midwives Board Examination, which in passing confers permission on them to practice in the Colony.

The Chinese make very good nurses and readily take to routine of any kind; they are quiet, and have the curious quality of frequently being able to anticipate one's wants.

There are seven public dispensaries in the Colony, some in connection with Chinese hospitals referred to. On one day a week a gynecologic clinic is held in each by Dr. Hickling, and patients paid about 4,500 visits last year. As she will now send most of the operation cases to the Tsan Yuk, it is evident that the gynecologic wards of this hospital will be very full in the future. I have given a somewhat lengthy description of the hospital, for I believe it will in all probability contribute more to the maternal welfare of the Colony than any other.

The Tung Wah Hospital contains some interesting features, notably the entrance hall, which is very resplendant with gold work pillars. In appearance it is suggestive of a temple with its little altar, which I presume is dedicated to the Joss of Medicine. Another item of interest is the Chinese pharmacy; like ordinary pharmacies it contains numerous drawers for storing drugs, but it is at once

noticeable that none of these drawers are labelled. The attendants however appear to be able to find any medicine they require without difficulty.

Chinese drugs appear to be made mostly from roots and barks, but in addition one is shown objects which we "Western Doctors" would not suspect to possess any medicinal value, namely cockroaches, sea horses, and such like; the latter I am informed is a very expensive medicine.

In addition to the ordinary pestle and mortar, the Chinese have a novel method of grinding up a drug. On the floor there is an oval trough, about two feet in length, about six inches wide at the top, shelving down to about a quarter of an inch at the bottom; the trough also slopes from each end towards the middle. The substance which is to be ground is placed inside, the mechanism is supplied by a small boy, who stands on the axle of a heavy metal wheel, about eight inches in diameter, which he rolls to and fro with his feet, keeping his balance by holding a rope suspended from the ceiling. Pills are large and are contained in a hollow ball of a beeswax-like substance about the size of a ping pong ball, which acts as a preservative.

In an adjoining room are rows of small ranges, each adapted to hold one pot about the size of a teapot, in which the roots or barks are placed for boiling, the infusion or decoction being then given to the patient. The dose is large, probably about a pint, given, I understand, usually in the morning. Outside there are rows of little open boxes, one for each patient being treated; as soon as the infusion is poured off, the spent roots are emptied into a box, where they are left for 24 hours, so that the patient's relatives can come and inspect the kind of medicine given.

I understand there are wards for "Western" treatment only, and wards for Chinese treatment, and admission to either is optional for the patient.

As far as I can make out every type of case appears to be admitted to the Chinese treatment wards, including fractures, but I have no means of judging of the efficacy of such treatment with regard to the latter.

In the maternity wards of the Tung Wah General Hospital, with seventeen beds, 1122 patients were attended in their confinements by the nursing staff, consisting of two trained nurses only.

In the same wards at the Kwong Wah, with eighteen beds, 1218 patients were confined during the year, the nursing staff consisting of one trained nurse and three probationers, or pupil midwives. There are, however, nine probationers undergoing training in the hospital. The period of training at this hospital is three years.

In the Wanchai Hospital with twenty beds, 812 cases were attended during the year, two trained nurses only being in the hospital.

As I already explained, the work of these hospitals is superintended by Dr. Hickling, and all the nursing staffs are Chinese. Dr. Hickling is also responsible for the training of the pupil midwives.

In the Maternity Bungalow of the Government Civil Hospital approximately 500 Chinese cases are attended every year, and perhaps 50 to 100 Europeans. The building is officially the maternity teaching centre of the University, but it is hoped that in the future more accommodation will be available, for the building as it now exists does not provide adequate space for a growing maternity clinic. The Government Hospital undertakes the general education of nurses and on completion of

three years' training the nurse is eligible to take midwifery instruction in addition. As far as I understand the object of the government training in this hospital is not so much to train girls for outside work as for duty in government hospitals.

My department in this hospital runs a general women's dispensary twice weekly. I am also endeavoring to make some provision for the treatment of syphilis in women. Unfortunately venereal disease is extremely common and a large venereal disease centre is a matter of urgent necessity, which I hope will be met in the future.

The Government midwives operating in the New Territory (i.e., the part of the mainland leased to Great Britain) delivered 730 women last year.

The policy in the Colony has been to train as many midwives as possible, since it is felt that they can do much to lower the maternal and infantile mortality; and I hope that it is evident from what I have said that the training of the pupil midwife is thorough and essentially practical. A girl who has lived in a hospital for three years under a system such as exists here must have personally nursed some hundreds of patients.

I am indebted to Dr. Gibson for the following account of the work done in the Alice Memorial Maternity Hospital.

The Hospital was opened in 1904, and although there were only twenty beds, some of those interested were doubtful if the Chinese would come in sufficient numbers to justify this new building.

In 1905 only 55 cases were admitted, while in 1917 the number had risen to 662, which affords a good illustration of how Chinese prejudice may be overcome.

The hospital is the maternity block attached to the Alice Memorial and Affiliated Hospitals; Chinese probationer nurses do three years training in general nursing, before taking out their midwifery course, which lasts a year.

Midwifery is taught in the Chinese language by the woman doctor in charge and the sister, assisted by Chinese doctors. All nurses take the course.

Only six nurses are in maternity training at the same time and each attends at least 75 confinements, often a larger number, and makes a complete record of the cases, measurements, etc. In the earlier years when women were unwilling to come to the hospital the midwives also attended extern cases, but that part of the work has been difficult lately, owing to the shortage of the staff.

After training, all nurses strive for the certificate of the Midwives Board (Hongkong); the examination is both written and oral, and requires a good education in Chinese.

Seventy-seven women have qualified as midwives and their services have proved useful; some are in Government service in Hongkong, others hold responsible positions in hospitals under Chinese management, a few are in the Straits Settlements, but the majority are in private practice in Hongkong.

By the training of Chinese women a large proportion of the confinements in the Colony are attended by properly qualified midwives and thus the work has been of considerable value to the community.

In the training of the midwife the importance of obtaining the help of a doctor in all serious cases is emphasized and, as a result, abnormal cases are seen at an earlier stage than heretofore; this is especially noticeable in such conditions as placenta previa.

As Hongkong is a long way from the United States a little local information may be of interest.

An estimate of the population of the Colony for the middle of the year 1924 was as follows:

Non-Chinese civil population	16,000
Chinese population, City of Victoria.....	420,000
Village of Hongkong	29,800
Kowloon	180,000
New Territories	85,000
Population afloat (i.e., sampans)	68,750
<hr/>	
Total Chinese population	783,550
<hr/>	
Total population	799,550
<hr/>	
The number of deaths of children under one year old was 4,735	
Non-Chinese	37
Chinese	4,698

Of these 1,131 Chinese were under one month old, and seven non-Chinese.

The ratio of infant deaths to total deaths was 30.4 per cent. There were eight registered deaths from puerperal fever in 1924, and nineteen in 1923.

There appear to have been in all thirty-three deaths from causes directly attributable to pregnancy.

Society Transactions

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF APRIL 1, 1926

THE PRESIDENT, DR. NORMAN L. KNIPE, IN THE CHAIR

DR. ALBERT B. DAVIS presented a case of **Fetal Death with Retention of Fetus in Utero and Necrosis of Uterus.**

Patient, L. C., colored, thirty-eight years old, first seen March 12, 1925, at the Cooper Hospital of Camden, N. J., for exaggerated nausea and vomiting of pregnancy. She was then apparently 3 months pregnant. Stated last period November 30, 1924. Had typhoid fever at eight years of age; operated (posterior colpotomy?) for pelvic abscess several years ago; no other adult sickness. One child living and well; no miscarriages or stillbirths. Menses normal.

Appearance on admission, thin, weak, acutely ill, having green emesis, temp. 99°; pulse 120. Eyes: Rather prominent arcus senilis but pupils reacted normally to light and accommodation. Tongue dry and glazed. Chest expansion negative. Moderate abdominal tenderness at level of umbilicus and over both lower quadrants. Uterus enlarged 3 months pregnancy; pelvis seemed otherwise negative. Blood count: 3,750,000 red; 10,300 white; hemoglobin 75 per cent; neutrophils 72; lymphocytes 16; large mono. 2. Wassermann negative except +1 in cholesterin antigen.

She was given proctoclysis of glucose and soda bicarbonate and hypos of corpus luteum 1 c.c. daily for about 10 doses. By the sixteenth there was marked improvement generally; emesis nearly ceased; abdomen much less tender. On the twenty-fourth she had nausea, but no emesis, and severe abdominal pain during the evening. This was much better the next day and there was no more emesis. On the twenty-seventh, condition was so improved that she was out of bed.

A radiograph of chest showed above the left clavicle several small spots of opacity suggestive of very early infiltration.

She was discharged on the twenty-ninth, temperature normal; pulse 90; very much improved and taking nourishment.

She was next seen in the prenatal clinic October 27, 1925, where she came stating she had not felt fetal movements since July. It was evident, after examination, and in light of previous hospital admission, that she was overdue; that there was no sign of fetal life and that the uterus was decreasing rather than increasing in size. Examination seemed to indicate absence of liquor amnii, uterus contracted about the fetus, with fetal bones in one or two areas, especially right upper quadrant, apparently close under abdominal wall, as though about to ulcerate through uterine wall. Patient seemed to be in perfectly good general health, stating, to use her own words, "she never felt better in her life." She had had no bleeding, no pain, or other indication of attempt of uterus to empty itself.

Because of length of time overdue, of evident absorption of liquor amnii, and fear of the condition of uterine walls, no vaginal examination was made and no

attempt whatever to induce labor, but section advised. This was done on November 5.

She was under ether anesthesia. The omentum and intestines were found adherent at numerous points to a necrotic mass which was the remains of practically a full-term fetus within a necrotic sac apparently formed by the uterine wall, as it seemed continuous with the lower uterine segment. The mass was removed without great difficulty in spite of the adhesions as adherent sections of the necrotic sac were sacrificed. There was very little bleeding. Though there had been no indication of infection, because of necessity for leaving portions of adherent necrotic material *in situ*, cigarette drain was inserted and the abdomen was closed.

There was very little postoperative reaction, and patient made an uneventful recovery—out of bed on the sixteenth and discharged on the eighteenth day after operation.

The points of interest in the case were the death of the fetus at or near term (without known cause), followed, instead of by any evident attempt of the uterus to empty itself, by absorption of the liquor amnii and the ulceration of the macerated fetus through a necrosed portion of the uterine wall, all without causing any untoward symptoms in the patient or interfering with her normal life.

DR. WALT P. CONAWAY reported a case of **Placenta Previa Associated with Severe Toxemia.**

An Italian woman, thirty-five years of age, para iii, pregnant eight and a half months, was admitted to the Atlantic City Hospital, August 8, 1925, suffering from lobar pneumonia and acute nephritis. She was transferred to our service for the relief of her pregnancy, on August 11.

The first day in the Atlantic City Hospital her temperature was 103°, pulse 130, respiration 48. Only ten ounces of bloody urine, heavy with albumin, and containing many hyaline and granular casts, were obtained by catheter during the first twenty-four hours. Her blood pressure was 196/120.

She gave a history of two attacks of uremia and of having had a therapeutic abortion performed at three months about one and a half years ago, on account of acute nephritis. There was some uterine bleeding and a pelvic examination revealed a placenta previa. She was very toxic; this of course, rendered a surgical procedure all the more hazardous. Instead of inducing premature labor, I felt that a celiohysterotomy gave her more chances of recovery. We operated August 11 and removed a living male child which weighed about six pounds. Only a minimum amount of gas-oxygen anesthesia was used as her condition in the operating room was not at all satisfactory. The diagnosis of central placenta previa was confirmed at operation. The baby was resuscitated with some difficulty and much to our surprise the patient made an uneventful recovery. The pneumonia and the nephritis rapidly cleared up and she left the hospital August 27 with her baby, both in good condition, and only sixteen days after operation.

DR. F. E. KELLER read a paper on **Narco Local Anesthesia in Cesarean Section.** (See page 234.)

DISCUSSION

DR. COLLIN FOULKROD said he would not feel inclined to use such an anesthesia for cases in which general anesthesia was safe, for the shock to the patient of any extra pain that might be produced would be certainly more than

that produced by ether anesthesia in normal cases. Therefore he believed the procedure should be reserved for such cases as need ligation of tubes in tuberculosis or similar conditions where general anesthesia is contradicted.

DR. CLIFFORD B. LULL claimed that local anesthesia has a very definite place in obstetric surgery. His experience was limited to seven cases of cesarean section, but his conclusions were the same as Dr. Keller's. He always gives the initial dose of morphine and scopolamin and repeats the scopolamin before operation. One case necessitated general anesthesia before he got through the operation. In the first two cases he had a great deal of trouble because the assistant pulled up on the uterus trying to hold it up through the abdominal incision. Since then, Dr. Lull used Dr. Newell's technic of taking two darning needles and piercing the uterus with the ends protruding on the abdominal wall which holds the uterus fixed while doing repair work, thereby obviating any pulling on the peritoneum, which causes pain. In all of his cases there was definite indication for sterilization, which was done at the same time. None of these cases was shocked and all made a smooth postoperative recovery. Each case had very definite organic disease which absolutely contraindicated general anesthesia.

DR. EDWARD A. SCHUMANN said he would like to corroborate all the statements Dr. Keller made and indeed to go a good deal further. He felt he could answer some of Dr. Foulkrod's objections. One is apt to begin working with local anesthesia hesitatingly and with a good deal of lack of faith. Dr. Schumann did practically all his cesarean sections by a similar technic and there is incomparably less shock with local than general anesthesia. In regard to pain during operation, there is a marked variation in women as to their susceptibility and ability to bear pain. An hysterical, nervous woman will complain of pain to some extent. He did not find it necessary to give a general anesthetic excepting in one case in which the placenta was so densely adherent that traction upon the uterus was sufficient to require gas. The great majority of these women do not complain at all. They make no sound, they are usually a little too confused and intoxicated by scopolamin, but woman after woman will ask whether she hears her baby crying.

DR. PHILIP F. WILLIAMS read a paper entitled **Is the Sedimentation Test of Practical Value in Gynecology?** (See page 228.)

DISCUSSION

DR. JOHN A. McGLINN said that when Friedlaender and Wiesmann first brought out this work he carried out the test in all cases, but found it a useless procedure, which did not help to diagnose a single case. When it came down to the question of operability his experience was exactly the same as that of Dr. Williams. He therefore discarded the test after several years' trial.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF MAY 6, 1926

THE PRESIDENT, DR. NORMAN L. KNIPE, IN THE CHAIR

DR. JAMES F. CARRELL presented a **Report of a Case of Uniovular Twin Pregnancy with Hydramnios.** (See page 243.)

DISCUSSION

DR. ALICE WELD TALLANT cited a case of marked hydramnios with large branchial cysts in the fetus which obstructed delivery.

DR. CAMILLE J. STAMM reported a case in which the patient went almost to term, the uterus was extremely large. There was a vertex presentation, the cervix dilated well and when the membranes ruptured, over a gallon of fluid was expelled with the cord. An easy version was done, up to the shoulder. Further progress was halted by a swelling, in the neck, found to be a large branchial cyst involving the entire neck. He punctured the cyst on one side which allowed it to collapse so that the head could be extracted.

DR. J. STUART LAWRENCE said that some women have such a condition only once and there are other cases on record where it seems to be chronic. He had found nothing in the blood chemistry, but in two cases of hydramnios, chronic endometritis preexisted.

DR. WILLIAM ELY reported a case of **Spontaneous Rupture of Cesarean Scar Observed During Laparotomy for Second Cesarean.**

The patient applied to the Maternity Hospital in November, 1925, for care during her second pregnancy, expected to terminate March 6, 1926.

Patient had had rheumatic fever when nine and scarlet fever when sixteen years old. In March, 1924, she was delivered of her first child by cesarean section after a thorough trial of labor.

The heart was enlarged downward and to the left, with a distinct systolic murmur at the apex; abdomen, enlarged to size of six months' pregnancy, well healed scar 8 inches long in midline to left of umbilicus; pelvis, generally contracted. Wassermann negative.

In January patient complained of increasing dyspnea which was promptly relieved by digitalis. There were no other signs of cardiac distress. Blood pressure and urine remained normal throughout pregnancy.

Examination in February showed disproportion between the fetal head and the pelvis. Elective section was decided on, but as the baby seemed small it was decided to await the onset of labor.

February 27, the patient went into labor. Operation was started after first stage pains were well established. Under ether anesthesia, incision was made slightly to the right of the old scar. There was a large omental adhesion on the anterior surface of the uterus, bridging over the old scar. This was divided and as the site of the previous incision was exposed a small hematoma about 1 cm. in diameter appeared. This enlarged rapidly and in less than half a minute the old scar had

separated and the underlying placenta was exposed. Without further incision the child was delivered. After removal of the placenta and membranes the edges of the scar appeared as thick, healthy, bleeding muscle. The uterine muscle was sutured with interrupted sutures of No. 3, 30 to 40 day chromic gut and Pagenstecher stay sutures. The peritoneal coat was closed with a continuous suture of No. 2 chromic gut. Abdominal wall was closed in layers as usual.

The baby boy weighed 6 pounds, 11 ounces, and measured 48.5 cm. in length.

The patient made an excellent recovery. Highest temperature was 100.2° on the day following operation. Temperature normal on third day, going to 99.8° the fourth day and remaining normal after the eighth day. The patient suffered marked postoperative distention.

The following data regarding the first section was obtained from the Wilmington Homeopathic Hospital. The uterine muscle was sutured with 2 rows of No. 1 chromic doubled, the peritoneal coat with No. 1 chromic single. Patient had a febrile convalescence with temperature of 101.6° the day following operation and still at 101° on the seventh day reaching normal the ninth day. Patient complained of pain in the right leg the second day after operation.

This case again emphasizes the fact that all patients having a cesarean section should understand the importance of arranging for hospital care at all future pregnancies.

DR. CAMILLE J. STAMM reported a case of **Rupture of Uterus Following Induction of Abortion, Recovery.**

Mrs. B. G., aged twenty-five, was admitted to the Jewish Maternity Hospital, May 4, 1924, at 6 P.M. with slight vaginal bleeding, pain over the entire abdomen, pain in the back, and general exhaustion. She had been married six years; general health good; two children living and well; normal labors. Menstruation normal, last period in December, 1923.

In August, 1923, when about three months pregnant, she had an abortion induced, bled for about one month, when she was curetted, and had rather a stormy convalescence.

The patient was now about in her sixth month of pregnancy, and on day of admission, May 4, 1924, arose as usual. At about 10 A.M., she was seized with a rather sharp pain in the abdomen, a sense of weakness, accompanied by slight vaginal bleeding. She called her family physician, who thought that probably she was going to abort, and he gave her an injection of morphine hypodermically. She slept most of the afternoon, and awoke about 5 P.M., complaining of feeling weak; her physician was called again. He was at once struck by her increased pallor, but her radial pulse was 80, and fairly strong, yet he suspected internal hemorrhage. Dr. Stamm was then called, and on vaginal examination found a slightly patulous os, uterus about the size of a six months' pregnancy, but slightly boggy at the fundus. He advised immediate removal to the hospital. Blood pressure was 75/55, pulse weak at the wrist, but the heart sounds were good; vaginal examination showed more dilatation of the cervix than at home, still the fundus presented the boggy feel. A Voorhees bag was inserted which was very shortly expelled. When he inserted his finger into the uterine cavity he found it empty, and a rent in the fundus near the right cornu. She was sectioned immediately and the entire product of gestation, intact, was found free in the abdominal cavity. The mass was removed, as were the comparatively few blood clots. Upon careful examination of the uterus, he found an old scar in the fundus near the right horn and the rupture had taken place through this. Because of her weakened condition, he excised the scar and put in three layers of sutures, rather than subject her to the more serious operation of

hysterectomy. She was then given a transfusion of human blood, 500 c.c., and recovered very rapidly. When discharged she was warned not to become pregnant again.

Subsequent History.—In spite of the warning she was again admitted to the hospital April 24, 1925, six months pregnant. Vaginal examination revealed, cervix obliterated, thickened, dilated two to three fingers, head floating, back to the left. Because of her previous history, and fear of a repetition of the uterine rupture, Dr. Stamm dilated the cervix manually, and did a podalic version, delivered a stillborn fetus, gave intrauterine douche and packed. She made a good recovery, and was discharged May 3, 1925, with the advice that she return for sterilization.

On December 23, 1925, she was admitted to the Medico-Chirurgical Hospital with the following history: Last regular period Sept. 18, 1925, nausea during the end of October and November, and irregular bleeding throughout the entire time. She had had a few chills, and on admission complained of vaginal bleeding, which continued until the twenty-sixth when she aborted spontaneously, but retained the placenta, which was removed without an anesthetic. She made a good recovery, and on January 6, 1926, Dr. Stamm again sectioned her and this time removed her appendix, and ligated both tubes with silk, double ligatures, excising the intervening portion of tube. At this operation he could not find the scar in the fundus, nor were there any adhesions. She made an uneventful recovery, and was discharged.

DISCUSSION ON THREE PREVIOUS REPORTS

DR. P. H. WILLIAMS believed that while the uterine muscle at the site of the old scar in Dr. Ely's case was undoubtedly as thick as is usually seen in any uterus after the child is extracted there must have been some weakening of the scar as a result of the febrile convalescence because the first section was done as an emergency measure after two days labor. There were also very extensive adhesions of the omentum to the uterine scar. He felt that the rupture was due to the fact that splinting of abdominal wall was removed from in front of the scar, because the hematoma followed retraction of abdominal wall and because the placenta had been located under the scar in this pregnancy. Holland reported some years ago that in 51 cases, the placenta in 34 was situated directly under the scar, and not under the scar in 17, showing predisposition to rupture when not so situated.

DR. J. O. ARNOLD some months ago reported at the Samaritan Hospital, six cases of complete or incomplete rupture of the uterus following former cesarean delivery. In at least two of these cases, on opening the abdomen the uterus appeared to be just on the verge of rupture, scarcely more than the peritoneal coat holding, so that the instant the knife touched the scar, the uterus burst open.

These cases showed that if labor had been allowed to come on, there would undoubtedly have been complete rupture at an early moment.

The significant point in all these cases was, that on looking up the records, each one had had some febrile temperature following the previous operation. However slight this postoperative rise in temperature, it always means infection somewhere, with the probability that it is in the uterine wound, and therefore such a patient will never be safe in a subsequent labor.

DR. W. W. VAN DOLSEN read a paper entitled **The Fallacy of the Present Day Treatment of the Postparturient Breast.** (See page 236.)

DISCUSSION

DR. GEORGE W. OUTERBRIDGE wanted to know whether these squares of gauze are kept constantly on the breast or whether the hypochlorite solution is removed, or whether the breast is washed off before the infant nurses.

DR. VAN DOLSEN in answer to Dr. Outerbridge said that hypochlorite is allowed to remain in contact with the nipple for one minute. The breast is then washed with sterile water before the infant is allowed to nurse.

DR. P. BROOKE BLAND read a paper entitled **Hydatidiform Mole Complicated by Perforation of the Uterine Wall and Secondary Chorioepithelioma of the Pelvis.** (See page 189.)

DISCUSSION

DR. PHILIP F. WILLIAMS considered it extremely difficult to tell when such growths are benign or malignant, when they are invasive and when they are not invasive. Three years ago he operated upon a young married woman of sixteen, who presented a slight toxemia and some bleeding. She had been married three months and the abdomen was the size of a six months pregnancy. The latter was removed, sections of tumor mass were subjected to two pathologists: one advocated the uterus to be removed, the other believed the condition to be benign. The subsequent history showed that the woman went along perfectly normally and delivered herself of a live child eighteen months ago. Another case of hydatidiform mole was found in a woman about the age of forty, with practically the same history of amenorrhea for three months, abdomen size of six months pregnancy. She had one normal period, second period came, did not stop, she returned to hospital for second follow-up, and realizing what might be present, we removed the uterus. At the posterior surface of fundus high up, there were three small purplish nodules. Although they were believed to be chorioepitheliomas, microscopic examination proved they were not.

DR. LEONARD AVERETT read a paper entitled **Nonspecific Protein Therapy in Gynecology.** (See page 238.)

NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

MEETING OF OCTOBER 14, 1926

DR. W. D. PHILLIPS demonstrated the Parent forceps, a French modification of the Tarnier instrument which he had observed in use in the Petit Hospital in Paris. The instrument is essentially the same as the original Tarnier model, with the addition of tapes by which traction can be made in incomplete rotation in occipitoposterior positions. The demonstration in the French hospital had been a very dexterous one and the instrument apparently served a very useful purpose in this particular complication. The usual axis traction attachment was sold with this model and could be used if desired.

DR. P. B. SALATICH spoke on the importance of careful examination before operation and thorough exploration at the time of laparotomy.

As Dr. John B. Deaver has well pointed out, the keynote of all diagnosis lies in a carefully taken and interpreted history and a thorough examination of the patient, and in these regards there is no difference between surgical and medical diagnosis. The outstanding symptoms for which a patient seeks relief may be secondary to a primary lesion which is forgotten or unnoticed until it is revealed

by routine examination, and that same examination may reveal respiratory, cardiac or renal disease which absolutely contraindicates the proposed surgical procedure. These facts cannot be too emphatically stressed in this day when, as more than one writer has pointed out, the rush and hustle of big business are unfortunately being carried over into the practice of the medical profession.

Not only is the laboratory being relied upon more and more to make our diagnoses for us, but more and more also are we inclined to make our preliminary examination of the patient a perfunctory affair, with the feeling that when the abdomen is opened, we can get whatever information we need then. Dr. Salatich more than once, in some of the larger hospitals of the country, had seen a surgeon operate upon a patient whom he was then seeing for the first time, and whose history and diagnosis he was then securing from the lips of his assistant. My own personal feeling, in some of these cases, was that a little more attention beforehand on the part of the surgeon would have eliminated some of this surgery, particularly where pelvic work was done.

In this connection it cannot be pointed out too often that in no case should laparotomy be advised for a woman until a careful pelvic examination has been made. H. Z. Griffin of the Mayo Clinic, where no patient is ever operated upon except by the surgeon who has himself worked up the case, comments on the fact that it is sometimes difficult to secure permission for such an examination, particularly in young girls. Not so many years ago, a woman who submitted to a pelvic examination without protest, was considered rather immodest, but fortunately today a saner view prevails, and such an attitude is at present considered false modesty. Indeed it is not unusual for patients to make the request for such an examination themselves. In those instances where the pelvic pathology is obscure or the examination difficult to make, examination under anesthesia should be done before operation is advised, and it is surprising how often this routine procedure will disclose the fact that laparotomy would be unwarranted.

The proper incision also plays an important part in the cure of a patient's condition. The buttonhole incision has a very small part in surgery today. In addition to the difficulty of securing proper exposure with this type of incision, the traumatism incident to pulling on organs just out of reach of the hand and the grave danger of hemorrhage, thorough exploration of the abdominal contents can never be done, and there is always a chance that there is present a condition considerably more serious than the one the operation is intended to remedy.

When Dr. Salatich first began to operate he believed that patients were very particular about the type of incision employed and its length, and he made the Pfannenstiel incision whenever he could, but changed his plan after a douche of common sense. As he was explaining to one patient what he proposed to do for her, he added that he would place her incision so that it would never be seen; considerably to his surprise she replied that that was a decidedly minor point, as she had no intention of exhibiting her abdomen. He had always preferred the longitudinal incision, with its better opportunities for exploration, and from that day forth used it.

CASE 1.—Miss M. was operated upon for appendicitis through a two-inch incision without relief of symptoms. One year later, again through a small incision, she was operated on for supposed adhesions. When she experienced no relief after this second operation, Dr. Salatich learned that she had a long history of menstrual disturbances, upon which no emphasis had been laid at her previous operations, and that no pelvic examination had ever been made for the old reason that "she was a young girl." She submitted to bimanual examination without protest and a marked retrodisplacement with bilateral cystic oophoritis at once revealed the obvious cause

of her continued pain and menstrual irregularities. Laparotomy for the correction of this pathology restored her to perfect health, a result which the first operation would have achieved if she had been properly examined at that time.

CASE 2.—A girl of sixteen was referred for operation for chronic appendicitis, and Dr. Salatich was told by her physician that the diagnosis was quite definite, so that further examination was unnecessary. As her menstrual history revealed periodic pain, he advised rectal examination, to which she submitted without protest. The right ovary was twice its normal size, and the left the size of an orange. Laparotomy through a median incision was done, and while the appendix did prove to be chronically diseased, it was obviously secondary to the serious pelvic pathology which might have been entirely overlooked.

CASE 3.—Mrs. T. was advised to submit to laparotomy for multiple fibroids and cystic ovaries. There was no question as to the diagnosis, and her symptoms pointed to this pathology and no other. In the course of routine exploration, there was found a gall bladder full of stones, and a tumor, grossly malignant, attached to the free border of the ileum. At this sitting the pelvic work was done, the symptoms were so urgent that this could not be postponed, the tumor was removed, and six inches of the intestine on either side was resected. The laboratory confirmed the diagnosis of malignancy. Six months later cholecystectomy was done, and examination at this time showed the site of the intestinal operation in good condition, with no evidence of recurrence. Since then (April, 1920) the patient has been examined at intervals, although she has been entirely free from symptoms of any sort, always with negative results, but it is obvious that only routine exploration at the time of the first operation revealed the very serious pathology which would undoubtedly have shortened her life if it had remained undiscovered.

DR. A. H. GLADDEN, JR. presented the report of a tubal, an abdominal and a uterine pregnancy in the same patient in ten and one-half months. The condition which causes ectopic pregnancy in one tube very possibly is present in the opposite tube, and for this reason many capable gynecologists argue that if the patient's condition permits it, bilateral salpingectomy should be done at the time of operation for the original condition. Schumann, however, after a review of the work of Giles, Essen-Møller and others, inclines to the opposite view, since one series studied showed 34 per cent of subsequent normal pregnancies as compared with 12.8 per cent of recurrent ectopics, while another and larger series showed that normal pregnancy occurred four times as frequently as repeated tubal pregnancy.

The consensus of opinion seems to be that in view of the fact that ectopic on the other side is not infrequent, bilateral removal of the tubes is safer for the patient, and that partial resection of the affected tube is most unwise, as a repeated pregnancy may occur on the same side.

Case Report.—L. G., colored female, age twenty-four, admitted to Charity Hospital Dec. 17, 1922, operated Jan. 5, 1923, discharged Jan. 16, 1923. Previous history negative. Menstrual history entirely normal. Last period one week before admission. Two full-term, normal deliveries, the last nineteen months ago. No miscarriages.

One week before admission she began to suffer from pain in the right lower abdomen. At first this was dull in character, but four days after the onset it suddenly became severe and was localized over McBurney's point. Flexing of the legs gave some relief. There was one attack of vomiting on the second day. The pain continued after admission, the last exacerbation being two days before operation.

There was slight pain and tenderness in the region of the right tube and ovary. Vaginal examination disclosed a definite, tender mass to the right of the uterus in the region of the tube and ovary.

Wassermann strongly positive. Urine negative. White cells 7,800, polys, 76 per cent, hemoglobin 85 per cent.

Operation was performed on a tentative diagnosis of chronic salpingo-oophoritis, possibly chronic appendicitis, under ether anesthesia. A large, subacutely inflamed appendix was found and later removed. The left tube and ovary were normal, as was the right ovary, but the right tube was enlarged and filled with blood, and was removed. The postoperative diagnosis of ectopic pregnancy was later confirmed by the laboratory, and later questioning of the patient revealed the fact that her last period before admission had been four days overdue. Convalescence uneventful.

July 23, 1923, this patient was referred to the Gynecological Clinic from the Surgical Clinic with the request for a pelvic examination. She stated that following her discharge she had been entirely well until a month ago, at which time, following a very severe pain in her right lower abdomen, she had had a prolonged fainting spell. There was no history of vaginal bleeding, but she had vomited in the morning for some days, and the attacks of pain had been frequent, sometimes twice a day. Her last menstruation had been March 15, 1923, this being the second period since her operation. Recently she had noted some enlargement of her abdomen.

Physical examination showed a palpable tumor mass in the right lower abdomen, about the size of a four and one-half months pregnancy, and vaginal examination showed this mass to be very soft and intimately connected with the uterus on the right. The cervix was soft, and the uterus was enlarged and soft. A tentative diagnosis of right ectopic pregnancy was made and she was admitted to the ward for observation.

Half an hour later, she was found in a state of complete collapse and almost pulseless. Rupture of the ectopic had evidently occurred, and the examination, although it was made gently and carefully, was felt to be responsible. Immediate laparotomy was done under light ether narcosis, bisecting the old scar. Both blood clots and fresh blood were present, the latter was removed with sterile laparotomy pads and later used for transfusion. On the right was a mass, the rupture of which revealed a fetus of about four months gestation. The right ovary was removed *in toto*, but the placenta, which was adherent to the posterior surface of the uterus, was not disturbed. The blood removed from the abdomen, which measured about 800 c.c., was citrated and strained, and was given intravenously while the patient was still on the table. Except that her temperature was at first very high, convalescence was without incident and she was discharged in good condition August 8, 1923.

February 23, 1923, this patient returned to the hospital complaining again of abdominal pain. Examination disclosed the presence of an apparently normal intrauterine pregnancy. She was delivered of a normal, full-term child August 30, 1924.

DR. P. B. SALATICH asked whether at the first operation the tube was merely ligated, or was a wedge-shaped piece removed? If simple ligation were done, the catgut might have cut through and the tube reopened.

DR. H. V. SIMS said that the most interesting feature of the whole case was the apparently positive proof of the transmigration of the spermatozoa. The right

tube, the site of the original pregnancy, was removed entirely at the first operation, yet the second pregnancy was on the right side also, and the spermatozoa evidently had to travel from the left tube through the pelvis to impregnate the ovum from the right ovary, which was left in situ. Another interesting point is that the patient did well after being transfused with her own blood.

DR. GLADDEN (closing) said it was routine on their service in surgery of the tubes to take a wedge out of the cornu of the uterus, and he did not believe that the second pregnancy could possibly have originated in the right tube. A somewhat similar case was reported by Fuchs, who considers the second pregnancy in his patient as of ovarian origin, on the same side as the original tubal pregnancy for which salpingectomy was done. In this instance Dr. Gladden first removed the right tube, and at the second operation, for the abdominal pregnancy, removed the right ovary. The left tube and ovary were thus left in situ, and the succeeding uterine pregnancy was perfectly normal.

Errata

In the article by Katherine Bement Davis, "Periodicity of Sex Desire" in the December issue of the Journal, the fifth line from the bottom of page 837 should read "sufficiently higher in *former groups*" instead of "latter group."

In the index of Vol. XII, December issue, report by Dr. John J. Gill, of a case of Choriocarcinoma of the Uterus Complicating Pregnancy, published in the August, 1926, issue, page 203, was inadvertently omitted.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Gynecologic Diagnosis

Bronnikoff: The Method of the Blood Corpuscle Sedimentation Reaction and Its Importance to Gynecology. *Zentralblatt für Gynäkologie*, 1924, xlviii, 1483.

The writer draws attention to the variation in results obtained by using different methods in estimating the rapidity of red corpuscle sedimentation, and introduces a modified method which he believes of more certain value.

This modification makes the application of the test possible for practically every practitioner and adds a valuable method of diagnosis where there is a question of the presence of inflammation, particularly in the tubes.

LITTLE.

Falta: The Use of Corpuscle Sedimentation in Obstetrics and Gynecology. *Zentralblatt für Gynäkologie*, 1924, xlvii, 1478.

Falta has made observations on the sedimentation time of red corpuscles in some thousand cases including patients at various periods of pregnancy and others affected by various gynecologic diseases. He believes that the procedure is of great value in diagnosis and concludes: Rapidity of sedimentation is constant in pregnancy after the fourth month. The value of the reaction increases with the advance of the pregnancy, but is of little value in estimating termination of the labor. For the first eight or ten days of the puerperium the sedimentation time remains much as during labor, but returns to normal at the conclusion of the third week. With impending abortion the sedimentation speed is more marked, and the same is true in subsequent endometritis. With inflammation of the adnexa the reaction is markedly increased, though where no virulent organisms are present it is normal.

For differential diagnosis between extrauterine pregnancy and tumor of the adnexa it is of doubtful value. With nonmalignant tumors the reaction is normal, with malignant tumors sedimentation speed is increased. In many cases of carcinoma the reaction is in definite relation to the development of the tumor, but this is not absolute. Recurrence may be recognized by changes in the reaction.

LITTLE.

Baer and Reis: The Sedimentation Test in Gynecology. *Surgery, Gynecology and Obstetrics*, 1925, xl, 691.

It had been known for centuries that blood from a patient suffering from any inflammatory disease, if allowed to stand, would separate out into two portions, one serum and one erythrocytes, thus forming the "crusta phlogista" of the ancients, first described by Galen. Studies of sedimentation time throughout the different periods of pregnancy, labor and the puerperium, also in all forms of gynecologic pathology with special reference to the inflammatory conditions have been undertaken. It has been found that the sedimentation test is apparently of no value in the early diagnosis of pregnancy. It is useful in determining the presence or ab-

sence of infection in the body. With pelvic pathology a negative sedimentation test (a sedimentation time over two hours) conclusively rules out pelvic infection. The rate of sedimentation is directly proportional to the virulence of the infection. The test is a further aid in determining the safe time for operation. It seems a more delicate prognostic index, good or bad, than either the leucocyte or temperature curve.

WM. C. HENSKE.

Nitschmann: Our Experience with the Erythrocyte Sedimentation Test in Gynecology. *Deutsche Medizinische Wochenschrift*, 1925, li, 393.

The following criterion for this test was used: over three hours is normal, between two and three hours may be normal but usually is not, and under two hours is pathologic.

The test in forty-five cases of pelvic inflammation showed that the sedimentation time varied from eleven minutes to six hours and forty-five minutes. The test paralleled the temperature and leucocyte count except that the lessening in time for sedimentation occurred before the rise in temperature and white count and remained for a time after the other two symptoms had gone down. Therefore, the test is of value in predicting a rise in temperature and leucocytosis, and may be used to determine the favorable time for operation after they have subsided.

In tubal pregnancy the time is not lessened unless there is an inflammatory process or an hematocoele present. Therefore, it may be of some value in the differential diagnosis between intact tubal pregnancy and salpingitis.

The majority of twenty-two cases of uncomplicated abortion had a sedimentation time of approximately one hour. This might be due to the loss of blood, a mild infection, or absorption from the dead fetus. Fifteen cases of abortion with fever had a time between fifteen and sixty-two minutes, most of them being between fifteen and twenty-five minutes.

Myoma cases showed an acceleration of sedimentation when they were complicated by anemia, necrosis or inflammatory processes. The same was true of ovarian tumors.

Cancer of the uterus showed an average of one hour. In general the operable cases took more than one hour and the inoperable less than that. In general malignant tumors of the genital organs showed an acceleration while benign tumors did not, but the difference was not clear-cut enough to be of value in differential diagnosis. Similarly there was not a great enough change to diagnose recurrences of cancer.

On the whole then this test is of value in diagnosing the activity of inflammatory processes and may become of value in differential diagnosis between benign and malignant tumors.

FRANK A. PEMBERTON.

Silzer, O.: The Blood Sedimentation Test in Gynecology. *Zentralblatt für Gynäkologie*, 1926, l, 353.

The test was used in almost every disease of the genitalia in an attempt to gauge its value. The writer concludes that operation for inflammatory adnexal tumors is not justified as long as the sedimentation time is below ninety minutes. Ectopic pregnancy and inflammatory diseases of the adnexa cannot be differentiated by the test when an internal hemorrhage is present because intraabdominal bleeding with subsequent resorption leads to shortened sedimentation time. A time of less than fifty minutes speaks for an adnexal inflammation, if an abdominal hemorrhage is absent. Initial cancers show normal sedimentation time, advanced cases a shorter one. Benign tumors and noninflammatory diseases of the genitalia show a normal average of five hours and twenty minutes.

GROVER LIESE.

Frosch: The Sedimentation Test in Obstetrics and Gynecology. *The American Journal of Surgery*, 1926, xl, 111.

The sedimentation test done by a special method according to Frosch has been of real value in determining the prognosis of a case. It lends help in the diagnosis and is of some value in deciding the time for operation. An increasing sedimentation time means that the patient is improving. A diminishing sedimentation time indicates that the patient is getting worse. This rule holds good for gynecologic and surgical cases. Any surgical patient who gives a sedimentation time of less than one-half hour requires an operation. The less the sedimentation time the graver the condition and the poorer the prognosis. He found the test of no value in the diagnosis of early pregnancy.

WILLIAM KERWIN.

Frommelt and Motiloff: The Blood Sedimentation Test in Gynecology. *Zentralblatt für Gynäkologie*, 1926, l, 348.

The blood sedimentation test is only of value when used in conjunction with other clinical methods of diagnosis and prognosis. The possibility of ascertaining correctly the most favorable time for the operation of inflammatory tumors of the adnexa by itself justifies its extensive use. The following conclusions are based on experience with 1,000 cases: In inflammatory adnexal conditions operations should be postponed if the sedimentation time is less than one hour. In noninflammatory tumors of the genitalia an acceleration of the sedimentation time below one hour should induce us to search for concomitant diseases or to anticipate complications in operation. In carcinoma the test can be used to recognize early the presence of a recurrence which causes a shorter sedimentation time.

GROVER LIESE.

Frommolt: Dangers and Mistakes in Diagnosis in Using Pertubation. *Zentralblatt für Gynäkologie*, 1925, xlix, 126.

The writer draws attention to the fact that tubal insufflation is not without danger and that no satisfactory method has been devised for completely closing the external cervical os to prevent reflux of the gas used. He believes that a preliminary careful bacteriologic examination is of the greatest importance and stresses the danger of air embolism as a result of damage to the endometrium while the instrument is being passed into the uterus. Improper diagnosis resulted when there was apparent patency of the tubes in the presence of "sactosalpinx" and equally false deductions may be due to the presence of polypi in the uterus. Too forceful injection may also result in air invasion of the mesosalpinx.

LITTLE.

Hauch: Female Pelvic Neuralgias. *Bruxelles-Médical*, 1925, vii, 204.

The gynecologist is constantly consulted by women complaining of lower abdominal and pelvic pain in whom pelvic examination does not reveal sufficient pathology of the pelvic organs to account for the symptoms. Hauch feels that many of these patients are suffering from a neuralgia of the obturator or inferior pudic nerves. The etiology of these neuralgias may be either pressure from other pelvic pathology, pressure from scar tissue contraction as the result of previous pelvic disorders, or a true neuritis or infection of the nerves themselves. The diagnosis rests on an increase in pain when pressure is applied to these nerves during the course of a vaginal examination. The obturator nerve may be reached by pressure over the subpubic foramen, while sensitiveness of the inferior pudic may be ascertained by pressure just below the sciatic spine.

The treatment consists of rest, building up the resistance, and the application of heat. The use of iodine and ichthyol tampons has also been a valuable adjuvant. Treatments over a long period of time are often necessary, and a permanent cure should not be promised as recurrence may arise following chilling, exposure, or grippe.

THEODORE W. ADAMS.

Seymour, H. F.: Endoscopy of the Uterus. With a Description of a Hysteroscope. *British Medical Journal*, 1925, ii, 1220.

Rubin, of New York, has designed a hysteroscope which is a modification of the cysto-urethroscope of McCarthy and can only be used combined with gas inflation.

The author found that it was not necessary to have an angled tube. The next problem was to get rid of the obscuration of the view by blood and mucus. He constructed a hysteroscope based on the principle of the bronchoscope. In the wall of this tube are three channels, one for the rod which carries the light and one on each side for suction; either channel can be used for irrigation if need be. The hysteroscope is gently introduced; a swab on a sponge holder is used as an obturator, and this prevents the lamp becoming obscured by blood.

The author thinks that endoscopy of the uterus is going to prove useful in diagnosing the uterine causes of genital bleeding, since it can reveal such lesions as glandular hyperplasia of the endometrium, polypi, retained products of conception, chorionepithelioma and carcinoma. A piece of tissue can easily be removed for microscopic purposes by direct vision.

F. L. ADAIR.

Pollart, R.: Insufflation of the Tubes. *Braxelles Médical*, 1926, xi, 353.

Pollart has supplemented carbon dioxide gas in tubal insufflation by filtered air. The air is introduced by means of a syringe which is connected to a mercury manometer, for recording the pressure. He feels that this method is simpler and fully as satisfactory, since 100 c.c. of air are easily and quickly absorbed.

The greatest value of the method is in determining nonpatency of the tubes in sterility cases where other means of examination reveal no pathology. It has also proved useful in the treatment of certain types of dysmenorrhea. However, it should be used only as an adjuvant to all other methods of gynecologic examination. Twenty-two cases of tubal insufflation are reported.

THEODORE W. ADAMS.

Adler, L.: Uselessness of the Term "Metropathy." *Wiener klinische Wochenschrift*, 1925, xxxviii, 605.

Adler objects to the term "metropathy" which Aschoff and Pankow introduced to describe certain uterine hemorrhages found in women whose genitalia are apparently normal. The term is useless in that it describes the condition no better than does the term "uterine bleeding," it is useless because the underlying cause must be determined before the condition can be correctly treated, and the term is incorrect because the cause of the bleeding lies, not in the uterus, but elsewhere.

He also objects to the term on the ground that no two men have the same clinical picture in mind when using it and quotes, at the two extremes, Schroeder and Sellheim. Schroeder considers it to be a persistence of the follicle with a cystic glandular hyperplasia of the uterine mucosa and Sellheim thinks of it in terms of structural changes of the uterine mucosa and musculature without a functional disturbance, or of functional disturbances alone, or of a combined picture of structural and functional disturbances. Doederlein and Kroenig speak of "metropathia inflammatoria chronica" in cases in which any inflammatory reaction can no longer be demonstrated.

Adler does not believe it necessary to have one term for so many different clinical pictures and feels that more effort should be spent in trying to determine the anatomic picture and the underlying pathology than on the nomenclature. The hemorrhages due to local anatomic changes must be sharply differentiated from those due to functional derangements.

RALPH A. REIS.

Schil: True Hemorrhagic Metritis and Its Treatment. *Journal de Médecine de Paris*, 1923, xxv, 503.

In the light of recent investigations, many of the cases formerly designated as "hemorrhagic metritis" can now be more accurately ascribed to an ovarian hypofunction, to pelvic congestion or other pathologic states. There remains, however, a certain number of cases exhibiting uterine hemorrhages where no definite pathology can be found. For these he uses the term "true hemorrhagic metritis."

By using the uterine endoscope he is able to recognize four types of endometritis: the villous, the fungoid, the polypoid and the cystic. He emphasizes the necessity of ruling out a beginning uterine malignancy in these cases.

Three methods of treatment exist: The chemical which consists in the intrauterine application of some caustic substance as zinc chloride. While giving good results in the majority of cases it is a dangerous method, terminating fatally in one of his cases. For this reason Schil has abandoned this method. The second method is the intrauterine use of radium. This, the author also states, is a dangerous and unsatisfactory procedure. The third type of treatment and the one now advocated by Schil is dilatation and curettage. This not only effects a cure in the majority of cases but permits a microscopic examination of the removed curettings.

THEODORE W. ADAMS.

Seitz, A: The Causes and Treatment of Gynecologic Bleeding. *Klinische Wochenschrift*, 1925, iv, 1920.

The most essential thing in determining the cause of gynecologic bleeding is an exact general and especially menstrual past history. The author recognizes three types of uterine hemorrhage: (1) Hypermenorrhea—the individual period is profuse, longer than normal, or both. The menstrual cycle is normal. (2) Polymenorrhea—profuse bleeding with a shortened interval, the interval often being irregular. (3) Metrorrhagia—continued irregular bleeding of no definite type. There is an irregularity both of interval and duration.

Hypermenorrhea is caused by: (1) Disturbance of blood supply. (a) Passive hyperemia in the lesser pelvis, (b) Active hyperemia. (2) Localized disturbances in the uterus. (a) All conditions which decrease contractility of uterus cause a more profuse menstrual flow, (b) hypertrophy of endometrium, possibly due to hyperovulation. (3) Abnormally long clotting time of blood due to constitutional causes. (4) Malposition, especially retroflexion.

Usually the uterine mucosa and ovary are normal, at most there might be an interstitial endometritis. Biopsy might reveal tuberculous endometritis or malignancy. A negative finding rules out any local cause for the bleeding.

The author emphasizes the following general rules for the treatment of hypermenorrhea: (1) Anomalies of blood distribution should be corrected. (2) Habits, where faulty, must be regulated. (3) Inflammation should be relieved either by physical and dietetic treatment or, if necessary, by operative interference. (4) Malpositions of the uterus are to be corrected. (5) In plethora and arterial hypertension one may use hydrotherapy or at times venesection. (6) For local disturbances of the uterus curettage and ergot are employed, also for infantile and hyperplastic

uterus but then together with administration of ovarian preparations, or calcium for special cases.

Polymenorrhea may occur as the result of derangement in the cyclic changes of the ovary, which may be caused by functional disturbances in correlated endocrines, especially thyroid, and by alterations of the ovarian parenchyma due to inflammatory processes in the genital tract. There may be no visible pathologic changes in the histologic pictures of ovary and uterine mucosa. They are found simply to correspond to the state of the shortened interval; or, if there is a disturbance in the cycle, especially of the secretion phase, with very irregular intervals, then one might see a distinctly altered anatomic picture. For treatment, above all, the basic cause must be ascertained, whether it is an inflammatory process or an endocrine disturbance.

Metrorrhagia has as causes: (1) During the period of sexual life, usually a disturbed pregnancy. (2) Juvenile and preclimacteric metrorrhagia are often due to marked disturbance in ovarian function. (3) Metrorrhagia at any time of life may be caused by benign or malignant tumors.

ADAIR AND SAFFERT.

Monlonguet-Dolérís, P.: Metrorrhagia Caused by Tumors and Cysts of the Ovary Occurring After the Menopause. *Gynécologie et Obstétrique*, 1924, ix, 493-514.

While the majority of metrorrhagias developing after the menopause are due to carcinoma of the uterine body, they are not uncommonly caused by the development of an ovarian neoplasm which produced phenomena in the uterus, tending to restore the activity of this organ. However, ovarian tumors developing after the menopause do not always cause metrorrhagia, since they were found in nineteen out of seventy-four cases studied. The prognosis of metrorrhagia of ovarian origin is good if the causal tumor itself is nonmalignant. The treatment should be surgical. The removal of tumor and uterus is generally necessary.

The ovarian tumors producing these hemorrhages are extremely varied in regard to size, location, and nature, but reaction within the uterus is the same, hemorrhages, leucorrhéal secretions, and hyperplasia of the mucosa, which sometimes may lead to the formation of polypi. This hyperplasia of the senile mucosa differs from the hyperplasia of the genital period in two respects, (1) absence of glands which have a serrated appearance, and (2) the cells of the stroma are not transformed into decidual elements through hyperplasia of their protoplasm.

It has been suggested that phenomena of senile reactivation of the uterus are due to an irritation of nerve plexuses of the hilum of the ovary which, due to anastomoses with laterouterine plexus and hypogastric ganglion, may have a trophic influence on the uterus. The author was unable to confirm this by animals experimentation.

FRED L. ADAIR.

Sellheim: Metroendometritis and Metropathy. *Deutsche medizinische Wochenschrift*, 1924, xlix, 707 and 748.

The author feels that the terms, endometritis, metritis, metroendometritis, and metropathy are too indefinite.

Under endometritis two groups can be differentiated. One is characterized by definite changes in the endometrium and uterine wall caused by gonorrhea, pyogenic infections, tuberculosis, and retained products of conception. The cardinal symptoms are discharge, bleeding, and pain. The treatment is well established. The other is characterized by the same symptoms often accompanied by general discomfort and vague complaints but no characteristic pathologic changes are found in uterus or ovaries. It seems to be due to a disturbance in the relation of the endometrium to the general organism through the internal secretions of ovary and other organs.

Senile endometritis, coming on at the menopause, is an example. It is usually worse after an artificial menopause resulting from radiation or operative castration. Functional disturbances at puberty have a similar cause. This may be called metropathy. Its etiology, course, treatment and curative results are still indefinite.

This second type is found in women who do hard work. Normal menstruation and endometrial secretion depend on a normal sexual life. Women doing men's work usually do not lead such a life. Other etiologic factors are sexual perversions; abnormal sexual stimuli as found in the theater, dancing, etc.; too little or too much cohabitation; the various methods of contraception and especially coitus interruptus. The author believes that avoidance of normal childbearing is an important factor in causing functional derangements.

Metroendometritis and metropathy are not sharply differentiable. The former begins as a local anatomic change, the latter with functional derangements leading secondarily to local anatomic changes. The best treatment for metroendometritis is curettage, but incidentally also the whole sexual life should be brought back to normal.

FRANK A. PEMBERTON.

Andrews, H. R.: Backache in Women. *British Medical Journal*, 1925, ii, 1207.

The following is a rough and ready classification of some of the causes of backache: (1) Disease or injury of some of the tissues of the back. This class emphasizes the importance, in the diagnosis of backache, of not trusting to abdominal, vaginal, rectal, and bimanual examination alone but examining the back itself. (2) Fatigue. A very large number of the chronic backaches of women are due to fatigue of the back muscles, often increased by weakness of the abdominal muscles and the consequent drag of the abdominal viscera. (3) Enteroptosis. Together with, or apart from, the fatigue element backache may be caused by enteroptosis and by enlargement of the abdomen from any cause. (4) Tumors, obesity. It is obvious that large ovarian and uterine tumors may cause backache by their weight, without any inflammatory changes, as may also a large collection of free fluid. (5) Carcinoma of the uterus and of the rectum. In some cases of this kind backache may be of almost intolerable severity. (6) Disease or infection of the kidney. Pyelitis or pyelonephritis is an exceedingly common condition, and often is not recognized until the patient has suffered from it for a long time, and has been uselessly treated for various conditions mistakenly held responsible for the backache. (7) Retroversion of the uterus. In the author's opinion, retroversion of the uterus without any fixation is sometimes responsible for backache. He does not believe that uncomplicated retroversion in young single women and in the elderly causes backache or calls for operation, and thinks that retroversions which cause backache would become less common if more care were taken during the puerperium to prevent the malposition. (8) Prolapse of the pelvic contents. A warning must be given once more against concentrating on treatment of weakness of the pelvic floor or retroversion of the uterus in cases in which almost all the abdominal viscera as well as the pelvic organs are sagging down.

F. L. ADAIR.

Dougal: Chronic Backache in Gynecology. *Lancet*, 1924, ii, 1220.

In this series of 1,000 patients he found that 235, or about 23 per cent, complained of backache, and that it was the principal symptom in one-third of this number.

The diseases found to be most commonly associated with backache were: genital prolapse, chronic cervicitis, endometritis and metritis, adnexal and periuterine inflammation, uterine fibroids, adenomyoma, and cancer of the cervix. Retroversions and retroflexions of the uterus, in the opinion of the author, do not play a predominant part in producing backache, except so far as they are associated with chronic endometritis, etc.

All operated cases were followed up as to the effect on this particular symptom. Replies were received from 152 patients, of which 62 had had no backache since the operation. Forty-two were much improved and 41 were no better. Seventy-three per cent of backaches associated with a gynecologic abnormality were cured or much relieved by appropriate surgical treatment.

The importance of backache in uncomplicated retroversion and retroflexion has been much exaggerated, as it is found, almost as frequently, in cases where the uterus is in a forward position. The most important factor in producing backache is fatigue of muscles.

Where there is a definite indication for surgical treatment the backache can be cured or much relieved in over seventy per cent of cases, the results being especially good in cases of prolapse treated by colporrhaphy.

NORMAN F. MILLER.

Huet: Rupture and Perforation of Pyosalpinx into the Peritoneal Cavity. *Journal de Chirurgie*, 1924, xxiii, 123.

The frequency of ruptured pyosalpinx, as given by various authors, differs widely, but it certainly cannot be classed as a rare occurrence.

Rupture may be caused by direct trauma of some kind or may be due to the lighting up of an old infection. In the first type, there is found a distinct tear in the tubal wall, while in the second, the aperture is more of the nature of a perforation, being due to the formation of perforative ulcers. In ten cases of rupture due to trauma there were only three deaths but in twelve perforations eight deaths.

These perforations vary greatly in size and shape and often are surrounded by a necrotic zone. They are usually single but in one case two openings were found. The rupture occurs most frequently in the ampulla of the tube.

The principal symptoms are severe pain, collapse, pallor, chills, and acceleration of pulse, followed by a steady rise in temperature, nausea and vomiting. The onset follows immediately the trauma in the cases of true rupture while in the cases of perforation the characteristic symptoms may not be present for several days. There is a marked rigidity of the abdomen with abdominal tenderness and lack of motion on respiration.

Rupture of the bladder, ruptured appendix and ruptured tubal pregnancy must be considered in the differential diagnosis.

Where the diagnosis is made early, operation is clearly indicated. If, however, the condition has progressed to the stage of abdominal distention, the prognosis is extremely poor. When the collection of pus is more or less localized and low down in the pelvis a posterior colpotomy is the operation of choice. This, however, implies the danger of leaving the infected tube as possible source of reinfection. Therefore, in those cases where laparotomy is necessary to reach the pus, he advocates a removal of the tube. Following all such laparotomies he inserts a drain at the lower end of the incision down into the culdesac.

THEODORE W. ADAMS.

Tixier and Rochet: Salpingitis in Elderly Women. *Archives Franco-Belges de Chirurgie*, 1925, xxviii, 659.

In patients from thirty-five to forty-five years of age salpingitis assumes an extremely grave aspect. It occurs unexpectedly both in women who have previously had a genital infection, and in those in whom there is no trace of previous infectious pathology. In the latter type there often exists a source of latent infection such as a degenerating fibroid or small local infections. In elderly women salpingitis is cured but seldom by medical treatment and the prognosis is always poor even so far as life is concerned. The treatment of choice is total hysterectomy as at this time of life the symptoms of postoperative menopause are negligible.

THEODORE W. ADAMS.

Books Received

EXAMINATION OF CHILDREN BY CLINICAL AND LABORATORY METHODS. By Abraham Levinson, B.S., M.D. Associate in Pediatrics, Northwestern University Medical School, etc., Chicago. Second edition, with 85 illustrations. St. Louis, C. V. Mosby Company, 1927.

DISEASES OF WOMEN. By Harry Sturgeon Crossen, M.D., F.A.C.S. Professor of clinical gynecology, Washington University Medical School, etc., St. Louis. Sixth edition, revised and enlarged, with 934 engravings, including one color plate. St. Louis, C. V. Mosby Company, 1926.

PRACTICAL SURGERY OF THE JOSEPH PRICE HOSPITAL. By James William Kennedy, surgeon of the Joseph Price Hospital, Philadelphia, etc. Illustrated with 129 original half-tones, some in color. Philadelphia, F. A. Davis Company, 1926.

HANDBUCH DER INNEREN SEKRETION. Herausgegeben von Dr. Max Hirsch, Berlin. Leipzig, Verlag von Curt Kabitzsch.

DAS RETICULO-ENDOTHELIALE SYSTEM IN DER SCHWANGERSCHAFT. Von Dr. Robert Benda. Mit 9 Tabellen und 7 Tafeln. Wien, Urban und Schwarzenberg, 1927.

BIOLOGIE UND PATHOLOGIE DES WEIBES. Herausgegeben von Josef Halban und Ludwig Seitz. Wien, Urban und Schwarzenberg, 1926. Lieferung 29.

SELECTED PAPERS, SURGICAL AND PATHOLOGICAL. By F. T. Paul, consulting surgeon, Liverpool Royal Infirmary. London, Bailliere, Tindall and Cox.

L'ANNEE OBSTETRICALE (Travaux de 1924). Par H. Vignes et J. Dauphin. Editeurs, Masson et Cie, Paris, 1926.